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The Official Dictionary of Telecommunications, Networking and the Internet

17th Updated and Expanded Edition

by Harry Newton

NEWTON's TELECOM DICTIONARY

The Official Dictionary of Telecommunications Networking and Internet

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NEWTON's TELECOM DICTIONARY

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Help Make This Dictionary Even Better

by Harry Newton

I love this industry. I love writing this dictionary. My wife says "Come on. 20 years is enough, already. I'm sick of seeing your back bobbing up and down as you get excited by yet another concept, another idea, another invention, another word. How many words can you keep adding? ... Get a life." Sorry, wife, I love doing this. I'll keep updating this dictionary until I die and then, my poor children will take over,maybe ... well, that's their problem.

I wrote this book for those of us turned on by this wonderful industry, for those of desperately trying to keep up, for those of us new to this industry and for those of us who simply want a respite from life for a few moments. Dip into this book. Dig around. You'll find something interesting, something you didn't know, something irrelevant, something relevant, something amusing, something warming. If I have fun writing this dictionary, you should have fun reading it.

I'm adding, updating, expanding and fixing 100 words a week. Still, neither Ray Horak, who's the absolute best technical contributing editor ever, nor I can keep up. So I beg you. If I'm missing a definition, or if a definition is unclear or, God forbid, wrong, please email me. Harry_Newton@HarryNewton.com.

I'm also looking for corporate glossaries and dictionaries — not ones that just have your company's products, nor ones that are secret, but ones with generic definitions of the specialized technical areas your company plays in. I love emailed glossaries. Please don't send lists of acronyms. There are more stupid acronyms in this world than Carter had liver pills. If I included all the ones I get sent, this poor dictionary would be 5,000 pages long. Each acronym would have at least five different meanings — which would be totally useless cause you'd never know what one meant. So no acronyms, please. Pretty please.

If you send me a glossary or several new, legitimate (not made-up) definitions I can use, I'll reward you with a free copy of the next edition. Please send me your street address. I can't send 1,000-page paper dictionary to email addresses. We aren't there, yet.

By the way, check out my new venture — Harry Newton's Technology Investor Newsletter — www.TechnologyInvestor.com.

Thank you.

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Where The Telecom, Networking, Fiber, Internet, Web Explosion Is Taking Us

by Harry Newton

No other industry is exploding as fast as the one we're in — whatever you call telecommunications, networking, fiber optics, the Internet and the World Wide Web. No industry is delivering as many benefits as this one. No industry is creating as many opportunities as these industries are. No industry is creating wealth as fast as this incredible industry is — or whatever it's now called. If you're an investor you MUST join me on my new venture, Harry Newton's Technology Investor Newsletter. www.TechnologyInvestor.com.

Where's it all coming from:

1. The Demand. Communications traffic worldwide is exploding — wired and wireless. Data and voice. Video and Music. Traffic on the Internet is doubling every 100 days. There'll be one billion people on the Internet by 2005. The demand is coming from everywhere — ecommerce, video, Internet radio, employee collaboration, business to business, business to consumer, etc. The traffic is coming on landlines and on wireless. It's coming on cell phones and on PDAs. It's coming on DSL and cable modems. We're "wiring" the world. Today — even after the huge growth in Internet usage in the last few years — more people are actually gabbing away on cell phone networks than are surfing the Internet. And now they're surfing the Web on cell phones using WAP and 802-11G wireless networks, and maybe soon Bluetooth. Ubiquitous, universal high-speed quality communications have created the "virtual" corporation, with mobile employees carrying laptops, cell phones and two-way pagers. This has led to a huge growth in virtual private networks, fueling more demand. Every business in the industrialized world has set up their own Web site — peddling and servicing their wares and buying their own raw materials over the Internet. More and more businesses are convinced they won't survive unless they have a Web site. More and more are convinced there are billions to be saved by having suppliers bid against each other online, using the Internet. They're right.

My phone company tells me their average "phone" call, when it was a voice call, was three minutes. Now it's an hour. I put a cable modem into my house. It's 30 times as fast as my previous dial-up and twice as fast as my previous DSL and virtually as fast as the T-1 line in the office. Downloads that used to take me hours now take minutes. My cable modem (thank you AOL Time Warner) is on all the time. It constantly brings me faxes, voice mail, email and alerts me to incoming phone calls. I do my shopping on my cable modem. I listen to Internet Radio. My favorite radio station is Klassik Radio from Hamburg, Germany. Listen on http://windowsmedia.com/radiotuner/default.asp. It's great station. Always "up" music. Lots of music. No commercials. And mercifully little talking. I watch my stocks on the Internet. I do my research on them via my cable modem and the Internet. I listen to conference calls when the executives report their results. I hear the analysts asking probing (and occasionally rude) questions. I hear the answers. I read magazines and newspapers on the Internet via my cable modem and my home local area network. I talk to my children on the Internet. My wife and I arrange our social life via the Internet. We share each other's Microsoft Outlook Calendar... Correction, she gets mine. I don't see hers. My cable modem's lightning speed and its immediacy — being on all the time — has changed my life. It (and other high-speed Internet access, like DSL) will change yours.

Network speed is a narcotic. Stand on any New York City street corner with two sandwich boards, "Free Money" and "High Speed Internet Access." Guess which one would get mobbed? The High Speed Internet Access. Everyone wants high-speed Internet Access. Demand for fast, reliable communications has barely been scratched anywhere in the world. My travels in the past year to Asia, Australia and Europe confirm this. Everyone asks me "When will we get high speed Internet access in our homes and in our offices?"

2. The Increasing Digitization. This is relatively old, but speeding up. We started digitizing phone conversations 30 years ago for two basic reasons: First, it improved their quality. You were no longer amplifying the crud (static and noise) that long distance analog calls picked up. With digital, you regenerated the calls. You recreated them like new. Digitization made cross-world calls sound as clear as cross-office. Second, digitization make the whole process cheaper. Digital componentry is cheaper, and getting cheaper day by day.

3. The Increasing Packetizing of Everything. A packet network is a lot more efficient than a circuit switched one. Packet networks "squeeze" zillions of conversations onto one line. Circuit switched networks have one conversation per line. Packet networks are cheaper,more efficient. The Internet is packet switched. The dial-up telephone network is circuit switched. Now you know why everything — including voice telephone calls — are switching to packet networks — private Intranets and the public Internet. It's much, much cheaper to call my sister in Australia over the Internet than over the normal switched phone network. About half as expensive.

4. The Hardware. The excitement centers on the dramatically improving price-performance of fiber optics (switching and transmission), digital signal processors and the high-speed routers of the Internet, now switching terabits of information each second. Fiber is amazing. No one knows how much capacity you can pump down one single fiber strand. In labs, we've sent 3,000,000,000,000 bits per second (three trillion bits per second) down a fiber strand a little thicker than one strand of your hair. The speed is totally awesome. A trillion bits per second (one million million bits per second) is enough to carry the entire world's Internet. That's the entire world's Internet traffic on one strand of fiber not much thicker than a strand of your hair. Imagine,bringing a strand of fiber to your house. The whole Internet could pass your door every second of every day..

Telecom's three building blocks — fiber, DSPs and routers — are improving about ten times faster in cost performance each year than computing's microprocessors and computer memory - silicon or magnetic. Though computing improvements get national publicity, telecom's improvements are more impressive and faster. Telecom's annual cost-performance improvement blows away Moore's Law (defined under M) by a huge margin. Computing's cost-performance improvements get the publicity. But telecom's win the race.

5. New Standards. Ten years ago, the telecom industry was entirely closed. Every manufacturer had its own set of standards, proprietary to itself. You couldn't connect a Siemens phone to an Ericsson switch, or a Lucent phone to Nortel PBX. Telecom standards existed only at the very lowest levels — basic analog phone lines. A persevering bunch of pioneers, coming chiefly from the computer industry, has pushed openings in the telecom industry, promulgating real, open standards that we can all use to build, Lego-style, new

telecom products. These pioneers work in a hodge-podge of volunteer and semi-government bodies — from the ATM Forum to the ECTF, from GO-MVIP to the ITU-T, from ANSI to the Internet Engineering Task Force and to private companies, from Microsoft to Intel, from Cisco to Juniper Networks.

As a result, there's been an explosion of new telecom standards, defining everything from telecom operating systems, to buses that carry voice inside and outside PCs, to new, cheap ways of encoding voice digitally, to new high-speed lines, to new telecom "building block" software (called applications generators) and, of course, to IP Telephony — phone and fax calls over the Internet or Internet-like networks. Open standards lead to low prices, lower barriers to entry and quick creation of new products. All this leads to explosive growth. We haven't seen nothing yet.

6. New Government Awareness That Competition Is Better Than Monopoly. The telecom industry has historically been closed — closed in architecture, closed to new suppliers, closed to new entrants. Telecom users have been mauled by high monopoly prices, typically those set by government phone companies. No longer. An example: A year after Germany deregulated its long distance calling, prices within Germany had dropped by 91%. That's a major drop! The United States de-regulated in the late 1960s and 1970s. Canada followed quickly. Israel and Australia deregulated in 1997. Europe deregulated in January, 1998.

Governments everywhere are waking to two powerful realizations: First, globalization is the most powerful economic force in the world today. Ignore it at your peril. Second, telecom is economic infrastructure. Companies and business go where globalization is friendliest and infrastructure is strongest. You can't have a modern development-friendly infrastructure and have a modern society when you have one bloated, glacial, government-run phone company charging ten times what phone companies a mile across the border charge. And you can't limit your entire country's telecommunications purchases to two or three gigantic, favored, cumbersome suppliers (as Europe, Japan and Australia had historically done). Within a few years, European and Japanese telecom should be as open as and as cheap as North America is today. Then come India and China, also opening up.

7. New Startups. Telecommunications is the hottest place for venture capital. No industry in the world — neither software nor petroleum — can match the incredible profitability of the zero-marginal-cost telephone or Internet carrier. If I call from New York to California, my call costs my supplier — AT&T, WorldCom, Qwest or whoever — basically nothing. All my carrier's costs are fixed. Other than the cost of billing me for my call, my carrier incurs no marginal cost for carrying my 3,000 mile call. Telecom is an incredible business. Even the oil business incurs variable costs. It must drag its raw materials out of the ground and schlepp it to markets across the world. That costs labor, fuel and depreciation on tankers. Then it must be refined.

Nobody to this day knows how many voice conversations or how much information of all kinds we can put down a single strand of fiber. Read the incredible developments in my definition of DWDM — Dense Wave Division Multiplexing. Add more photonics and electronics at the end. Put more calls down the fiber. More electronics. Coming soon: Photonic switching. More calls. More opportunities. No one knows what voice and video marvels the Internet can deliver. Large images, animation, moving 3D graphics, movies on demand are about to proliferate on the Internet. We'll need more and more telecom bandwidth. Smart engineers are leaving big, sluggish telecom manufacturers in droves and starting new companies. There already are hundreds of "new telecom" millionaires. Germany and France have recently dropped their taxation rates, encouraging entrepreneurs Germany now allows its call centers to stay open 24hrs/day, seven days a week. The European Union is now 375 million people. A another 60 million people are being added in the next few years, with new country admissions. Silicon Fen, in Cambridge, England is now the second largest venture capital market in the world. Soon, there will be dozens more Silicon Fens springing up all over Europe. And coming soon, G3. Europe did a spectacular job, standardizing for digital cell phones all over Europe. Now it's moving to G3, with some heady wireless data communications ability.

8. Dramatically Falling Prices. All the above brings dramatically lower prices. I mentioned Germany's 91% drop. Israel used to have the highest international calling prices of any developed country. Then the government in the late 1990s allowed in a handful of new carriers. The criterion for getting a service permit was not financial, but simply how far you were prepared to drop your long distance and international prices. The carriers proposing the lowest possible prices won government approval. Within two weeks, international rates from Israel to the U.S. dropped 50%. By the end of the first year they had dropped 94%. Israel suddenly became the center of international callback (see my definition).

This new telecom environment is driving radically new paradigms into an erstwhile staid industry. Among them:

- Because of fiber, long distance and international calling are becoming incredibly cheap. As the world is increasingly fibered up, costs will continue to plummet. Communications will be postalized — one low price wherever you call. Soon we'll pay $25 a month and call anywhere in the world and speak as long as we want, as often as we want. Flat rate calling everywhere for voice and data. One day we'll all be connected at high speed to the Internet all the time on whatever device we choose — our PC, our home LAN, our phone (wired or wireless), our PDA, our TV set. On The Net All The Time. Instant email. Instant news. Over the air TV brought us 5 channels. CATV (cable TV) brought us 50. Satellite TV brought us 500. Internet TV (movies on demand) will bring us 50,000. People will live and work where they choose. Just as I do.

- Wireless will get more interesting. Wireless has exploded because of digitization and digital techniques that enabled providers to cram many many times the number of users into the same sliver of bandwidth. Virtually all of today's wireless "conversations" are voice — people speaking to each other. But tomorrow, most wireless "conversations" will be data, as people send each other messages, receive stock quotes, and surf the Internet. Essentially a wireless phone is a far better business tool than a wired phone and a wired PC. You can get in touch with your customers. They can get in touch with you, no matter where you are. A functioning accessible wireless phone obsoletes the aggravation of voice mail. Wireless is easier to deploy. Load a Coke machine with a cell phone. It can call when it's empty. It can raise prices when the temperature rises. Deploying a Coke machine with a cell phone is a lot faster than waiting for a landline to be installed. Wireless has a long way to go. I'm always comforted by the fact that there's far more spectrum waiting to be used than is presently used. The lack of wireless spectrum is a myth. And I've seen a tiny color screen in a cell phone that has the resolution fo a pc screen (480x640 soon all phones will be movie cameras

- Telecom switching hardware will go through the same mainframe-to-client/server PC revolution that the computer industry went through in the past 20 years — with one big difference: The telecom industry will skip the mini-computer generation. In telecom, we are very close to the "central office inside the PC." As competition and new technology arrives, the time to market new telecom features will drop from three years to three weeks. As telephone central offices move to shoe box size, so each desk will become its own central office, with individual telecom customization opportunities beyond anyone wildest imagination. One day everyone's telephone system will be as personal as their PC. Telephone software will be available for downloading from the Internet or buying shrinkwrapped from your local Wal-Mart.

- Voice, fax, imaging and video will migrate to and join data in one common IP network — the Internet and the corporate Intranet (the corporate equivalent of the Internet). This will drive telecommunications pricing further down, add features and new capabilities (bandwidth on demand to the home, follow-me-find-me, etc.), It will shrink space, shrink time and vastly expand (and improve) every aspect of human endeavor — from remote education to business telecommuting, from remote medical diagnosis to high definition TV

entertainment, from massive multi-user gaming adventures to serious understanding of our neighbors' failings (my tiny hope for world peace).

● Ecommerce will explode. Who would have imagined the 1992-1995 phenomenon which produced the democratization and commercialization of the Internet? Who could have imagined prime time TV showing www Web site addresses to the great unwashed American public on prime time TV. Who could have imagined dot com companies spending $2 million a spot on the Super Bowl. How easy mainstream America has accepted www addresses.

This Internet happening is, I believe, as important to the dissemination of knowledge and changing our lifestyles as the invention of the Gutenberg Press was in 1453. The Internet and the Web as a buying mechanism is immature — five years old. Physical shops are 5,000 years old. Even call centers are older (and more mature). As ecommerce matures in the next few years, it will become a totally pleasurable experience (it isn't at present), eclipsing in emotion and excitement anything physical shops have ever delivered. We'll have avatars — personal shoppers. We'll have web sites personalized to our needs. We'll have 3D movies of distant vacation spas we're interested in visiting. We'll have access to all the information about the products and services we're interested in — not the smatterings that are on today's Web. It will take time (and bandwidth). But the journey will be unbelievably rewarding, exciting and bubbling with serious business and personal opportunities.

● This revolution will change the way we work more than any other. The industrial revolution brought us into the city. But its primary by-products — the automobile and the highway — delivered pollution, downtown decay, urban crime and other unwanted problems. The low-energy, non-polluting "telecom" revolution is different. It gives each of us the opportunity to live where we choose — downtown Detroit, in the mountains of Colorado, or in Sri Lanka, where Arthur Clarke (inventor of the geosynchronous satellite) lives. More of us will telecommute. By the end of the year 2000, over 50% of Americans will not work out of conventional offices. They'll work out of their homes, their cars, their RVs, their hotels and their temporary offices.

This telecom revolution gives our cousins overseas grand new opportunities. As telecom calling costs plummet, the industrial world will export its service jobs, just as it exported its manufacturing jobs. U.S. airlines will answer their calls from U.S. customers in India, Nepal, China. Already, Microsoft, HP and Swissair have call centers in India and answer calls from customers in North America. They're already calling the Indian city of Hyderabad — Cyberbad.

I wish I were 30 years younger. The next 20 years in this — the most fantastic of all industries — will be totally incredible. Adjectives can't describe the excitement I feel.

How To Use This Dictionary

This is a dictionary to work with every day. Companies give it to their new employees to bring them up the telecom and Internet learning curve. Salespeople include the definitions in proposals to customers. Novices love it because it cuts through the clutter. Users explain telecom things to their boss. Management uses it to understand telecom technicalities. Lawyers even use it in court. Sometimes they rely on it. God help the justice system.

Give my dictionary to your new employees, your users, your customers, your prospective customers, to your boss. Give it to your kids to let them understand what you do. They'll understand why you, too, have no life.

Most technical dictionaries define terms tersely, often in other technical terms. As a result they leave you more confused. This dictionary is different, deliberately so. My definitions tell you what the term is, how it works, how you use it, what its benefits are, what its negatives are. I tell you how it fits into the greater scheme of things, and I occasionally sound warnings or issue buying checklists. And sometimes I include a few fun definitions — mainly to amuse myself, but hopefully to give you some pleasure. Skim. You'll find them.

How This Dictionary Is Organized

My definitions are a combination ASCII / alphabetical order. Definitions containing non-letters — like @, #, / and numbers — are in ASCII order. Definitions with real letters are in alphabetical order. I use ASCII because it gives order to hyphens, periods, forward slashes, numbers, etc. Here is the order you'll find in this dictionary:

Blank Space	= ASCII 32	5	= ASCII 53
!	= ASCII 33	6	= ASCII 54
#	= ASCII 35	7	= ASCII 55
& (Ampersand)	= ASCII 38	8	= ASCII 56
- (Hyphen or dash)	= ASCII 45	9	= ASCII 57
. (Period)	= ASCII 46	: (colon)	= ASCII 58
/ (Forward slash)	= ASCII 47	; (semi colon)	= ASCII 59
0 (zero)	= ASCII 48	A (capital A)	= ASCII 65
1	= ASCII 49	Capital letters to ASCII 90	
2	= ASCII 50	\ (back slash)	= ASCII 92
3	= ASCII 51	Lower case letters	
4	= ASCII 52	start with a	= ASCII 97

How The Dictionary Spells

My dictionary conforms to American spelling. To convert American spelling to British and Canadian spelling typically requires adding a second "L" in words like signaling and dialing (they're American) and changing "Z" in words like analyze to analyse. Center in American is Center. In Britain, Europe, Australia and Canada, it's Centre. This dictionary contains more British, Australian and European words than my previous editions — a result of several overseas lecture tours.

What Style This Dictionary Follows

All high-tech industries make up new words by joining words together. They typically start by putting two words next to each other. Later, they join them with a hyphen. Then, with age and familiarity, the hyphen tends to disappear. An example: Kinder garten. Kindergarten. and now Kindergarten.

Sometimes it's a matter of personal choice. Some people spell database as one word. Some as two, i.e. data base. I prefer it as one, since it has acquired its own logic by now. Sometimes it's a matter of how it looks. I prefer T-1 (T-one), not T1, simply because T-1 is easier to recognize on paper. I define co-location as co-location. Websters spells it collocation, with two Ls, one more than mine. I think mine is more logical. And Mr. Webster is dead. He can't argue with me.

Plurals give trouble. The plural of PBX is PBXs, not PBX's. The plural of PC is PCs, not PC's, despite what the New York Times says. The Wall Street Journal and all the major computer magazines agree with me. The plural possessive is PBXs' and PCs', which looks a little strange, but is correct. In this dictionary, I spell the numbers one through nine. Above nine, I write the numbers as arabic numerals, i.e. 10, 11, 12, etc. That conforms to most magazines' style.

Sometimes the experts don't even get it right. Take something as common as 10Base-T. Or is it 10BaseT? 10Base-T thing is an IEEE standard. So you'd think they'd know. Forget it. Go to their web site, www.ieee.org. You'll find as many hits for 10Base-T as for 10BaseT. Ray and I checked every known and unknown expert in the Western world (i.e. those living within a block or two of Ray). We now believe the correct spelling is 10Base-T.

Sometimes, I don't simply know. So I may list the definition twice — once as two separate words and once as one complete word. As words and terms evolve, I change them in each edition. I try to conform each new edition to "telecomese" and "Internetese" as it's spoken and written at that time.

Bits and Bytes per Second. All About Speed

Telecom transmission speed has confused many of my readers. Read this. I hope this will help:

The telecom and computer literature is loaded with references to Bps and bps. You'll see them as Kbps or KBps, or Kbits/sec. You'll see them as Mbps or MBps. You'll see them as Gbps or GBps. Not much consistency. Let me explain:

First, k means Kilo or a thousand. M means mega or one million. And g means giga, which is a thousand million, or 1,000,000,000. The term kbps means a thousand bits per second. And that's a telecom transmission term meaning that you're transmitting (and/or receiving) one thousand bits in one second.

KBps (with a big B) means one thousand bytes per second. That's a computer term. And it usually refers to speeds inside the computer, e.g. from your hard disk to your CPU (central processing unit — your main microprocessor). There's a big difference between a bit and a byte. A byte is eight bits.

That's the way it's meant to be. But, there's a lot of sloppy writing out there. You'll see MBps or MB/s also meaning one million bits per second as a telecom transmission speed. You really have to figure out if the writer means telecom transmission — i.e. anything outside the computer — or if it's internal to the computer in which case it's bytes and a computer term. You can usually tell from the context.

Measuring the speed of a communications line is not easy. And tools to measure lines are still very primitive. Look at the strange speed reports you get from Microsoft Windows Dial-up Networking, or from its reports of download speeds. Notice how inconsistent Microsoft is about measuring speed. About the only certain thing you know is that the speed of a circuit is always measured by the slowest part of the circuit. Look at the Internet. You might be getting horribly slow downloads, despite being on a T-1. That might be due to a horribly overloaded server at the other end or it might be due to the fact that your T-1 is overloaded with other users at the office, also downloading. These days with faster lines what's often a gating a factor is the speed of your PC. It may be simply not be fast enough for your PC's browser to keep up with the speed of your incoming bits. In which case you need a faster PC — it happened at our home when we got the DSL line. We had to upgrade to faster machines.

Virtually all telecom transmission is full duplex and symmetrical. This means if you read that T-1 is 1,544,000 bits per second, it's full duplex (both ways simultaneously) and symmetrical (both directions the same speed). That means it's 1,544,000 bits per second in both directions simultaneously. If the circuit is not full duplex or not symmetrical, this dictionary points that out. For now, the major asymmetrical (but still full duplex) circuit is the xDSL family, starting with ADSL, which stands for asymmetric, which means unbalanced. The DSL "family" no longer starts with "A," and most of it (but not all of it) is still asymmetrical. The one major exception, SDSL (Symmetrical Digital Subscriber Line) is clearly symmetrical.

There's one more complication. Inside computers, they measure storage in bytes. Your hard disk contains this many bytes, let's say eight gigabytes (thousand million bytes). That's fine. But they're not bytes the way we think of them in internal computer transmission terms. They're different and they have to do with a way computer stores material — on hard disks or in RAM. They're what I call "storage bytes." When we talk 1 Kb of storage bytes, we really mean 1,024 bytes. This comes from the way storage is actually handled inside a computer, and calculated thus: two raised to the power of ten, thus 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 = 1,024. Ditto for one million, two raised to the power of twenty, thus 1,048,576 bytes. See also BPs.

Which Words Got Defined?

Which words get defined? These are my rules: All the important terms in the field. No proprietary products, i.e. those made by only one firm. No proprietary terms. My rules are not precise. Writing a dictionary is very personal. I read over 100 magazines a month. I study. I cogitate. I try to understand. Eventually, my wife calls, "Enough with the words, already. It's 2:00 AM. Time to sleep."

How This Dictionary Handles Plurals

Plurals give trouble. The plural of PBX is PBXs, not PBX's. The plural of PC is PCs, not PC's, despite what the New York Times says. The Wall Street Journal and all the major computer magazines agree with me. The plural possessive is PBXs' and PCs', which looks a little strange, but is correct. In this dictionary, I spell the numbers one through nine. Above nine, I write the numbers as arabic numerals, i.e. 10, 11, 12, etc.

There are no rights or wrongs in the spelling business, except that my dictionary is now the correct way of spelling telecom words. My dictionary is correct, because it's the biggest seller (by far). Lawyers use it in court. They get judgments based on what's in my dictionary. Or what was in my dictionary. They often call me and beg me for a ten-year old copy of my dictionary. I always put an outrageous price on my "precious personal library" copies. Sometimes they pay. Most times they don't. Cheaper people you'll rarely find.

A or An? Here's The Logic

I admit my fallibility. This edition of this book is riddled with "a" when it should be "an" and "an" when it should be "a." I've never been confused. I always believe "an" is used before vowels, and "a" before consonants. Not so, says my friend, Jay Delmar, who edits technical documentation. Here's his explanation.

Concerning the problem of what article ("a" or "an") should be used with a word or an acronym, it all depends on how the acronym is pronounced, that is, whether it's pronounced as a string of letters or as a word. In some cases, the article would be the same. In others, the form would have to switch. Usually "an" is used before vowels, but some consonants require it as well, and some vowels require an "a." It all depends on the sound. Whether a letter is intrinsically a vowel or a consonant doesn't really matter; what matters is if it's pronounced as a vowel or a consonant in the particular context.

If an acronym is pronounced as a string of letters, the following shows the appropriate article to use with the first letter of the acronym:

An A	An H	An O	A V
A B	An I	A P	A W
A C	A J	A Q	An X
A D	A K	An R	A Y
An E	An L	An S	A Z
An F	An M	A T	
A G	An N	A U	

If an acronym is pronounced as a word, the article might need to change:

An RS-232, but a RAM (pronounced "ram")
An STP, but a SRDM (pronounced "sardem") and a SLC (pronounced "slick")
An FTP, but a FAIC (pronounced "fackey")
An HIC, but a HICUP (pronounced "hiccup")

According to The New York Public Library Writer's Guide to Style and Usage, "The article a is used before all consonant sounds, including a sounded h, a long u, and an o with sound of w (as in one). The article an is used before all vowel sounds except a long u and before words beginning with a silent h." This definition has never helped me because I've never really understood why in "an STP" the "s" sound is a vowel sound and in "a SRDM" the s sound is a consonant sound. Basically, I rely on my ear.
The real trouble, of course, is that unless one is really, really familiar with the acronym, one doesn't know how it's actually used: pronounced as a string of letters or as a word. I thought SIPL would be "an SIPL" (an ess-eye-pea-ell) until fairly recently. I didn't know it was pronounced "a sipple"-or "a sighpull" (I've heard it both ways).

Jay makes sense. I'm going to try to be more in line with his concepts in upcoming editions. But this one may have a few inconsistencies.

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I wrote this dictionary on a series of ever-newer, ever-faster Toshiba laptops (very reliable machines) using The Semware Editor, a very beautiful text editor, which Sammy Mitchell of Marietta, GA wrote, and which I wholeheartedly recommend — www.semware.com. The Toshiba laptop for this dictionary was the Toshiba Tecra 8100. It's a 750 Mhz Pentium III machine with 256 Meg of RAM and a twenty gigabyte removable hard disk.

If you're wondering what I'm doing now, please visit www.HarryNewton.com and www.TechnologyInvestor.com

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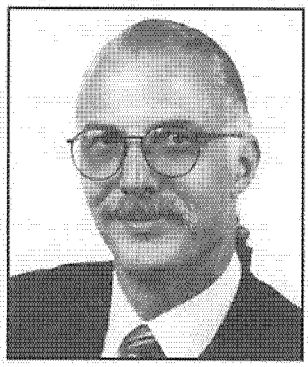
Ray Horak is internationally recognized for developing and delivering world class seminars on telecommunications technologies, services and management systems. He speaks annually before thousands of telecom, networking and IT professionals in public and private seminars, workshops and conferences.

Ray has been widely acclaimed for his ability to unravel the intricacies of voice, data, video systems and networks. His seminars provide technical depth, while being delivered in a commonsense, plain-English, and thoroughly understandable fashion. I first met Ray a long time ago, and rediscovered him through a seminar he taught for TCA (TeleCommunications Association) in 1995. I asked Ray to work with me on this dictionary because we both believe in explaining complex technologies in a way normal, intelligent business people can understand. Ray also works 24 hours a day, just like I do. We send each other e-mails in the middle of the night, across time zones and continents.

Ray also is a regular contributor to leading industry trade publications and is a member of the Advisory Boards of Datapro/Gartner Group and Computer Telephony Expos. He is also a member of a number of several prestigious Editorial Boards, including "The Connectivity Management Handbook," "The Journal of Telecommunications in Higher Education," "Telecom Business," and "Teleconnect Magazine." Ray also has written his own best-selling book, "Communications Systems and Networks," published by M&T Books in 1996 and now in its fourth printing; he is working on the second edition for IDG Books, which acquired M&T. It's a great book, and a perfect companion to this dictionary. Get it from www.amazon.com, www.barnesandnoble.com, www.hollisterassociates.com, or www.idgbooks.com.



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Ray's experience in communications dates back to 1970, when he joined Southwestern Bell. His experience also includes AT&T, Bell Telephone Laboratories, and CONTEL, where he served as region Vice President. He founded several companies for CONTEL, before serving as General Manager for the company's Houston Executone operation. Ray has been on his own for the last dozen years, and wouldn't have it any other way.

Ray is President of The Context Corporation, an independent consultancy and training organization in Mt. Vernon, Washington state.

According to Ray, his greatest literary accomplishment was an article he wrote for Teleconnect Magazine in June, 1990. A long-time friend from his CONTEL days read it and called him, after having lost touch with him for years. They got together during one of his seminar tours, and discovered that they were still very much in love. They kept in touch. He and the friend, Margaret Blanford, were married on Friday, December 13, 1996, in defiance of traditional superstitions. They are the happiest two people on the face of the Earth. They never thought they would be back together during this lifetime, and they cherish every moment of it.

coming in. That's called bridging. Imagine bridging as connecting a phone at a right angle. When you do that, you've made what's known as a "bridged tap." The first thing to know about bridging is that bridging causes the electrical current coming down the line to lose power. How much? That typically depends on the distance from the bridged tap to the phone. A few feet, and there's no significant loss. But that bridged tap can also be thousands of feet. For example, the phone company could have a bridged tap on your local loop, which joined to another long-defunct subscriber. The phone company technicians simply saved a little time by not disconnecting that tap. If you want the cleanest, loudest phone line, the local loop to your phone should not be bridged. Instead it should be a direct "home run" from your central office to your phone.

Bridging can be a real problem with digital circuits. Circuits above 1 Mbps (e.g., T-1) should never, ever be bridged. Because of the power loss, they simply won't work or will work so poorly they won't be worth having. ISDN BRI channels are also digital. But they were specifically designed to work with the existing telephone cable plant, which has a huge number of bridged circuits. Telephone companies typically will install ISDN BRI circuits with up to six bridged taps and about 6,000 feet of bridged cabling. But that's a rule of thumb. And frankly, if I were getting an ISDN line, I'd ask for a line that had no taps and no bridges.

4. To conference on another party. For example, when the repair tech says "let me bridge on my Supervisor" or "who's on this bridge?". See Conference and Conference Bridge.

See Internetworking, Loading Coil, Routers, Source Routing and Transparent Routing.

Bridge/Router A device that can provide the functions of a bridge, router, or both concurrently. A bridge/router can route one or more protocols, such as TCP/IP and/or XNS, and bridge all other traffic.

Bridge Amplifier An amplifier installed on a CATV trunk cable to feed branching cables.

Bridge Battery A small supplementary battery on a laptop which holds the contents of the memory and the system status for a few minutes while you replace a drained battery. NEC uses the term on its UltraLite Versa laptops.

Bridge Clip A small metal clip that used to electrically connect together two sides of a 50 pair block. Removing the bridging clips breaks the circuit. You might remove the clips when you want to insert a piece of test gear and check to see which side the trouble is on.

Bridge Equipment Equipment which connects different LANs, allowing communication between devices. As in "to bridge" several LANs. Bridges are protocol-independent but hardware-specific. They will connect LANs with different hardware and different protocols. An example would be a device that connects an Ethernet network to a StarLAN network. With this bridge it is possible to send signals between the two networks, and only these two networks.

These signals will be understood only if the protocols used on each LAN are the same, e.g. XNS or TCP/IP, but they don't have to be the same for the bridge to do its job for the signals to move on either LAN. They just won't be understood. This differs from gateways and routers. Routers connect LANs with the same protocols but different hardware. The best examples are the file servers that accommodate different hardware LANs. Gateways connect two LANs with different protocols by translating between them, enabling them to talk to each other. The bridge does no translation. Bridges are best used to keep networks small by connecting many of them rather than making a large one. This reduces the traffic faced by individual computers and improves network performance.

Bridge Group Virtual LAN terminology for a group of switch interfaces assigned to a singular bridge unit and network interface. Each bridge group runs a separate Spanning Tree and is addressable using a unique IP address.

Bridge Lifter A device that removes, either electrically or physically, bridged telephone pairs. Relays, saturable inductors, and semiconductors are used as bridge lifters.

Bridge Tap An undetermined length of wire attached between the normal endpoints of a circuit that introduces unwanted impedance imbalances for data transmission. Also called bridging trap or bridged tap. See Bridged Tap.

Bridged Jack A dual position modular female jack where all pins of one jack are permanently bridged to the other jack in the same order.

Bridged Ringing A system where ringers on a phone line are connected across that line.

Bridged Tap A bridged tap is multiple appearances of the same cable pair at several distribution points. A bridged tap is any section of a cable pair not on the direct electrical path between the central office and the user's offices. A bridged tap increases the electrical loss on the pair — because a signal traveling down the pair will split its signal between the bridge and main pairs. You can't run high-speed digital circuits, e.g. T-1, over cable that has bridged taps in it. But you can run ISDN circuits over cable with a limited number of bridged taps. See Bridge and Loading Coil.

Bridger Bridger Amplifier. An amplifier which is connected directly into the main trunk of a CATV system, providing isolation between the main trunk and multiple (high level) outputs.

Bridging Bridging across a circuit is done by placing one test lead from a test set or a conductor from another circuit and placing it on one conductor of another circuit. And then doing the same thing to the second conductor. You bridge across a circuit to test the circuit by listening in on it, by dialing on it, by running tests on the line, etc. You can bridge across a circuit by going across the pair in wire, by stripping it, etc. You can bridge across a pair (also called a circuit path) by installing external devices across quick clips on a connecting block.

Bridging Adapter A box containing several male and female electrical connectors that allows various phones and accessories to be connected to one cable. Bridging adapters work well with 1A2 key systems and single line phones, but usually not with electronic or digital key systems and electronic or digital telephones behind PBXs.

Bridging Clip A small piece of metal with a U-shape cross-section which is used to connect adjacent terminals on 66-type connecting blocks.

Bridging Connection A parallel connection by means of which some of the signal energy in a circuit may be extracted, usually with negligible effect on the normal operation of the circuit. Most modern phone systems don't encourage bridging connections, since the negligible is rarely negligible.

Bridging Loss The loss at a given frequency resulting from connecting an impedance across a transmission line. Expressed as the ratio (in decibels) of the signal power delivered to that part of the system following the bridging point before bridging, to the signal power delivered to that same part after the bridging.

Bridle Cards Proprietary Basic Rate ISDN Dual Loop Extension that lets ISDN service be provided up to 28,000 feet away. See ISDN.

BRIDS Bellcore Rating Input Database System.

Briefcase A Windows 95 feature that allows you to keep multiple versions of a file in different computers in sync with each other.

Brightness An attribute of visual reception in which a source appears to emit more or less light. Since the eye is not equally sensitive to all colors, brightness cannot be a quantitative term.

BRISC Bell-Northern Research Reduced Instruction Set Computing.

Brite Cards And Services Basic Rate Interface Transmission Extension lets telephone companies extend service from ISDN-equipped central offices to conventional central offices. See ISDN.

British Telecommunications Act In 1981 in the U.K. this act separated telecommunications from the post office and created British Telecommunications (BT). See also Post Office Act.

Brittle Easily broken without much stretching.

Broadband 1. A WAN term. A transmission facility providing bandwidth greater than 45 Mbps (T3). Broadband systems generally are fiber optic in nature. See also Bandwidth and SONET. Contrast with Narrowband and Wideband.

2. A LAN term. A multichannel, analog, coax-based LAN. It almost defies the imagination that one would use an analog LAN for connectivity of digital computers, yet they exist. 10Broad36 is a standard for such a LAN. The real, and only, value of such an approach is that it will support multiple, simultaneous communications channels through Frequency Division Multiplexing (FDM). Some CATV (Community Antenna TeleVision) providers have upgraded their old coax systems to support broadband LAN communications. The coax systems were put in place to support multiple, downstream FDM analog TV channels. The upgrade supports bi-directional data channels for applications such as Internet access, LAN networking, and even POTS (Plain Old Telephone Service). Colleges and universities have upgraded their old CATV networks to broadband LANs, which were put in place to provide entertainment TV to the dormitories. Some theme parks have put them in place to support simultaneous audio, paging, closed-circuit TV and transaction processing. Contrast with Baseband. See also 10Broad36, CATV, FDM, and LAN.

Broadband Amplifier An amplifier with a relatively wide frequency response as distinguished from a single channel or narrower band amplifier.

Broadband Bearer Capability A bearer class field that is part of the initial address message.

Broadband Integrated Services Digital Network B-ISDN.
Broadband Loop Emulation Services See BLES
Broadband Personal Communications Standards BPCS. Consists of 120 MHz of new spectrum available for new cellular networks. Also known as wideband PCS.
Broadband Switching System See BSS
Broadcast 1. To send information to two or more receiving devices simultaneously — over a data communications network, voice mail, electronic mail system, local TV/radio station or satellite system. Broadcast involves sending a transmission simultaneously to all members of a group. In the context of an intelligent communications network, such devices could be host computers, routers, workstations, voice mail systems, or just about anything else. In the less intelligent world of "broadcast media," a local TV or radio station might use a terrestrial antenna or a satellite system to transmit information from a single source to any TV set or radio capable of receiving the signal within the area of coverage. See also Narrowcasting and Pointcasting. Contrast with Unicast, Anycast and Multicast.
2. As the term applies to cable television, broadcasting is the process of transmitting a signal over a broadcast station pursuant to Parts 73 and 74 of the FCC rules. This definition is deliberately restrictive: it does not include satellite transmission, and it does not include point-to-multipoint transmission over a wired or fiber network. In spite of the fact that the broadcast industry and the cable television industry are forever bound together in a symbiotic relationship, they are frequently at odds over policy issues. See Broadcast Station. Compare with Cablecast.
Broadcast Channel BCCH. A wireless term for the logical channel used in certain cellular networks to broadcast signaling and control information to all cellular phones. BCCH is a logical channel of the FDCCH (Forward Digital Control CHannel), defined by IS-136 for use in digital cellular networks employing TDMA (Time Division Multiple Access). The BCCH comprises the E-BCCH, F-BCCH and S-BCCH. The E-BCCH (Extended-BCCH) contains information which is not of high priority, such as the identification of neighboring cell sites. The F-BCCH (Fast-BCCH) contains critical information which must be transmitted immediately; examples include system information and registration parameters. S-BCCH (System message-BCCH), which has not yet been fully defined, will contain messages for system broadcast. See also IS-136 and TDMA.
Broadcast List A list of two or more system users to whom messages are sent simultaneously. Master Broadcast Lists are shared by all system users and are set up by the System Administrator. Personal Lists are set up by individual subscribers.
Broadcast Message A message from one user sent to all users. Just like a TV station signal. On LANs, all workstations and devices receive the message. Broadcast messages are used for many reasons, including acknowledging receipt of information and locating certain devices. On voice mail systems, broadcast messages are important announcement messages from the system administrator that provide information and instructions regarding the voice processing system. Broadcast messages play before standard Voice Mail or Automated Attendant messages.
Broadcast Net A British Telecom turret feature that allows each trader single key access to a group of outgoing lines. This is designed primarily for sending short messages to multiple destinations. The "net" function allows the user to set up and amend his broadcast group.
Broadcast Quality A specific term applied to pickup tubes of any type — vidicon, plumbicon, etc. — which are without flaws and meet broadcast standards. Also an ambiguous term for equipment and programming that meets the highest technical standards of the TV industry, such as high-band recorders.
Broadcast Station An over-the-air radio or television station licensed by the FCC pursuant to Parts 73 or 74 of the FCC Rules, or an equivalent foreign (Canadian or Mexican) station. Cable television systems are authorized by FCC rules to retransmit broadcast stations; however, such retransmission is subject to a number of restrictions:
- The cable television operator is liable for copyright royalty fees collected by the Copyright Office.
- Under certain conditions, certain broadcast stations are eligible for mandatory carriage.
- Under certain conditions, the cable operator must obtain the permission of the licensee of the broadcast station. This term includes satellite-delivered broadcast "superstations" such as WGN-TV and WWOR, but it does not include:
- Satellite-delivered non-broadcast programming services (HBO, ESPN, C-SPAN, QVC, etc.).
- Video services delivered by terrestrial microwave systems such as MDS, MMDS, or ITFS, unless the actual signal being delivered was originally picked up from a broadcast station.
- Cablecasting programming originated by the cable operator or an access organization.

Broadcast Storm A pathological condition that may occur in a TCP/IP network that can cause a large number of broadcast packets to be propagated unnecessarily across an enterprise-wide network, thereby causing network overload. Broadcast storms happen when users mix old TCP/IP routers with routers supporting the new releases of TCP/IP protocol. Routers use broadcast packets to resolve IP addressing requests from stations on LANs. If a station running an old version of TCP/IP sends such a request, TCP/IP routers in an enterprise-wide network misunderstand it and send multiple broadcasts to their brother and sister routers. In turn, these broadcasts cause each router to send more broadcasts, and so on. This chain reaction can produce so many broadcast messages that the network can shut down. It should be noted that this is extremely rare and it happens only in TCP/IP networks that use two specific TCP/IP protocol releases.
Broadcast Transmission A fax machine feature that allows automatic transmission of a document to several locations.
Broadwing The name for the merged company comprising the old Cincinnati Bell Inc., a LEC (Local Exchange Carrier), and IXC Communications, an IXC (Interexchange Carrier) which acquired Cincinnati Bell. The merged company changed its name to Broadwing Inc. in 2000. Cincinnati Bell continues to operate as a LEC division of Broadwing. www.broadwinginc.com.
Brochureware A pejorative term for what companies can pull off with a clever copy writer, some nice graphics, and a bit of an advertising budget. Ever read a brochure and compared it to the product? You get the idea. See Webware.
Broken Link A link to a file that does not exist or is not at the location indicated by the URL. In short, you click on a hyperlink on a Web page you're viewing, but nothing happens or you get an error message. Bingo, broken link. You've been sent somewhere that doesn't exist. This is neither exciting, nor good programming.
Broken Pipe This term is usually seen in an error message by browser programs to let the user know that the stream of information which was downloading at the time has been forcibly cut. This can occur for many reasons, most commonly because you are on a very crowded network or your access provider is experiencing heavy traffic.
Broken Record In the 1960s, 1970s and 1980s there was an expression that you sound "like a broken record." This meant that you were repeating yourself. The expression came from the fact that when a needle got stuck in the groove of a vinyl record, the sound simply repeated itself. Then came the compact disc and the needle never got stuck in the groove since there was no needle. As a result, college kids today have idea what the expression "broken record" means, since most have never owned nor seen a record player.
Broker A company (or person) that buys and sells equipment often without taking ownership. A broker does not test or refurbish the equipment. Often, it never sees the equipment it buys and sells. Instead, it has the equipment shipped from the supplier to the customer, relying on the supplier to have tested and refurbished the equipment. Its specialty is knowing who has what equipment nationwide and selling it, possibly, at below-market price. See Secondary Equipment.
Broker's Ally A popular software application used by brokers for contact management.
Brokernet A virtual private dedicated network offering from New York Telephone and provided within Manhattan aimed at brokerage, banking and message industries. It uses digital switching to provide virtual private lines, specifically "hot line" service.
Bronze Alloy of copper and tin, widely used and known since ancient times. Copper content in bronze varies between 89% and 96%.
Brouter Concatenation of "bridge" and "router." Used to refer to devices which perform both bridging and routing functions. In local area networking, a brouter is a device that combines the dynamic routing capability of an internetwork router with the ability of a bridge to connect dissimilar local area networks (LANs). It has the ability to route one or more protocols, such as TCP/IP and XNS, and bridge all other traffic.
Brown and Sharpe Wire Gauge An older name for American Wire Gauge, the U.S. standard measuring gauge for non-ferrous conductors (i.e., non-iron and non-steel), AWG covers copper, aluminum, and other conductors. Gauge is a measure of the diameter of the conductor. See AWG for a full explanation.
Brownfield The opposite of greenfield. Brownfield is the sum of all legacy material (equipment, architectures, procedures, etc.) in any given network project. Greenfield refers to the material being developed anew. See Greenfield and Legacy.

of optical signals as they are transmitted through a network. Instead of trying to compensate for large amounts of signal dispersion at the end of a network, DCG periodically removes the distortion where needed along the transmission line. See Solitons.

Dispersion-Shifted Single-Mode Fibers These types of fibers have a different internal configuration. This changes the zero total chromatic dispersion point to 1550nm. This is important because the attenuation at this wavelength is only about half as much as at 1300nm.

Display The visual presentation of information, usually on a TV-like screen or an array of illuminated digits.

Display Driver A piece of software which translates instructions from the software you are running into thousands of colored dots, or pixels, that appear on your video monitor. A display driver is also called a Video Driver. Symptoms of a video driver giving trouble can range from colors that don't look right to horizontal flashing lines to simply a black screen. In the Macintosh world, Apple rigidly defined video drivers. Windows, in contrast, is a free-for-all. Windows 3.1 defined the lowest common denominator of displays — namely 16 colors at 640 x 480 pixels. But most multimedia programs and many games won't run with only 16 colors. They require at least 256 colors.

Display Phone A telephone that has a LED display. Also called an Executive Phone. Display phones are usually difficult to read because the displays are not backlit. Phone lines and PBX extension lines don't have enough power to run the display without an external power adapter and most telephone equipment makers don't want to sell phones with an external power adapter. It limits where phones can be placed and therefore how many can be sold. Display phones typically allow both "programmable keys", buttons that can be programmed for speed dial, conference, etc. and "soft keys", buttons that change function as different features are used, and also can show the number that is being dialed, and internal callers' names and extensions.

Displayboards Also called Readerboards or Wall Displays. Readerboards are typically found in call centers. They are electronic displays, sort of like giant TVs. They are typically hooked into the ACD or PC monitoring the machine and they throw up information about how many people are waiting in line, how long the longest person has been in line, how well the agents are doing and, often, whose birthday it is today. The idea is that all the agents in the call center can see the Readerboards and change their behavior accordingly.

Disruptive Technology A disruptive technology is a new technology which destroys an existing technology by being better, faster and cheaper. Most disruptive technology is not introduced by existing companies. Consider the ignoble end of that pioneer of minicomputers, Digital Equipment Corporation. DEC built the fastest, smartest and most reliable of computer systems for use at the department level. It listened to its customers and continually squeezed yet more performance from its stick VAX super-minis. Where is DEC today? Subsumed within Compaq, the world's largest supplier of personal computers. The market for DEC's innovative hardware, lightning-fast Alpha processors and rock-solid software was obliterated by the lowly, cheaper PC.

In his 1997 study of disruptive vs. sustaining technologies, Clayton Christensen of Harvard Business School pointed to the dilemma that all industrial leaders face. On the one hand, they have to listen carefully to their customers, who want predictable improvements in (sustaining) technology. Fail to provide that and they could be quickly out of business. Yet, on the other hand, they must also be ready for the mayhem that could ensue if, out of the blue, some radical (disruptive) technology were suddenly to rewrite the rules and render their company's products irrelevant. Christensen tells of a meeting with Andy Grove of Intel in which Grove interrupted Christensen to exclaim, "I get it! It's not the technology that's disruptive, it is how the technology disrupts the business model!" Christensen has studied hundreds of technology introductions, and found that incumbent companies are expert at bringing new technology to market if it sustains their existing value proposition, but they are horrible at bringing disruptive technology to market. For example, if we were waiting for the mini-computer makers (e.g. DEC and Wang) to bring us PCs, we'd probably still be waiting.

Distance Learning A form of instruction in which video and audio technologies are used so as to allow students to attend classes in a location distant from where the course is being presented.

Distance Sensitive Pricing Product pricing based on the distance (airline mileage) between the originating and terminating locations of a call/data transmission.

Distance Vector An approach, or algorithm, used by network equipment in selecting the best available network path by calculating the total distance over which a packet would travel on each alternative route. The shortest distance is usually the most preferred.

Distance Vector Protocol A routing protocol designed to minimize the number of hops (i.e., link-level connections between routers) which a data packet must travel from the originating device to the terminating device. Such a protocol causes each router to regularly broadcast the entire contents of its routing tables to all neighboring routers. Each recipient adds its own "distance" vector by incrementing the distance value by 1, and passes the data to its neighbors, and so on. (Note that "distance" refers to the number of routers transversed, rather than the geographic distance over which the signal propagates.) This method automatically allows the involved routers to discover and rediscover any route failures and restorals, and to "converge" on consensus-level route selections. However, this method is bandwidth-intensive in large, complex networks, as large routing tables are passed around the network frequently; during such processes, the bandwidth available in support of user data is diminished significantly. Therefore, distance vector protocols are best used in relatively small router networks with relatively few inter-router connections. Network factors such as link speeds and congestion levels are not considered in distance vector protocols. Distance vector protocols include IP RIP, IPX RIP, and AppleTalk RTMP. Distance vector algorithms also are known are known as Bellman-Ford algorithms. See also Link-State Protocol, Path Vector Routing Protocol, Policy Routing Protocol, Router, and Static Routing.

Distant Learning A Pacific Bell term for students sitting in front of TVs and phones and participating in classes that are being held and delivered elsewhere. In one of PacBell's trials, they used a T-1 signal, so the distant lecturer could see and hear his distant students using full-color video.

Distinctive Dial Tones In some phone systems, dial tones sound different. An internal dial tone sounds different to an external dial tone. The logical reason for this is simply to alert the user as to whether he or she is making an intercom or an outside local or long distance call.

Distinctive Ringing First, distinctive ringing is a feature that offers extra numbers which cause different ringing patterns on a line. When the main number is called, the called party will receive the normal ringing pattern. If one of the extra numbers is dialed, that line would ring with a different cadence. In North America, the normal ringing pattern is a single ring every six seconds. The distinctive ring patterns are 1) two short rings every six seconds, or 2) a short-long-short ring.

Different ringing patterns are also used in conjunction with such features as busy call return to indicate a freed line. One test done by Bell Canada set up a special ringing pattern (different from any of the featured distinctive rings) to indicate an incoming long distance call. Each telephone company has its own name for this feature: Ident-a-Call, Teen Ring, Feature Ring, etc. In any case, different ringing patterns allow for calls to certain people, or to sort out different call purposes such as for voice, fax, modem, or answering machine.

Distort To change some characteristic of a signal during its transmission. See Distortion.

Distortion 1. The difference in values between two measurements of a signal — for example, between the transmitted and received signal. "Distortion" typically refers to analog signals.

2. In imaging, distortion is any deformation of the on-screen image. Two common types of distortion are pincushion and barrel.

3. When used in relation to AC power distribution, this refers to deviations between the actual AC voltage waveform delivered to the user and the ideal sine wave of voltage. Total distortion is usually expressed as a percentage of desired sine wave, for example, a square wave has approximately 33% distortion. Distortion in AC power systems can also be resolved into a series of harmonics. In this case percentages for each harmonic (such as the third, fifth, seventh, etc.) are provided. The square root of the sum of the squares of the individual harmonics is equal to the total distortion. This definition courtesy APC.

Distributed Capacity The capacity in a coil due to the proximity of the turns.

Distributed Common Control There are two elements of telephone switching: the switching itself and the control of that switching. The earliest step-by-step telephone switches had their "Control" built into them. The dialing information at the beginning of the call physically moved switches. You could say, as a result, that control was distributed throughout the switching system. Then came the 1940s and crossbar exchanges, and the economics pointed to centralizing control. Then came computerized or stored program control (SPC) switches in which large computers were used centrally to perform virtually all the functions of the erstwhile electromechanical senders, registers, markers, etc. — those things which affect the setting up and tearing down of the call. As computers got smaller and as microprocessors appeared (the so-called computer on a chip), it became economical and efficient to place inexpensive microprocessors in the telephone circuits themselves, in essence getting much of the processing done before it hits the central processing

unit. Increasingly, as special microprocessors (so-called "computers on a chip") for telecommunications evolve, we will see more and more of the processing being distributed to further and further away from the central point and closer and closer to the originating telephone instrument. It will be rare in coming years for telephones to come without microprocessors. One day, each phone will have its own switch and the rest of the system will just be one gigantic loop of cable — not unlike today's local area networks.

Distributed Computing Environment DCE. A comprehensive integrated set of services that supports the development, use, and maintenance of distributed applications. Digital Equipment Corporation's DCE is an implementation of the Open Software Foundation's DCE (OSF DCE). In response to OSF's request for distributed computing technology, Digital submitted for consideration four of Digital's established distributed computing technologies:
Remote Procedure Call (RPC), a joint effort with HP/Apollo; Threads Service, based on Digital DECthreads; Cell Directory Service (CDS), based on the Digital Distributed Name Service (DECdns); Distributed Time Service (DTS), based on the Digital Distributed Time Service (DECdts). See DCE for more detail.

Distributed Data Processing DDP. A data processing arrangement in which the computers are decentralized — i.e. scattered in various places. Hence, processing occurs in a number of distributed locations and only semi-processed information is communicated on data communications lines from remote points to the central computers. The object of DDP is to split processing among multiple computers, to save telecommunications charges and to improve network response time.

Distributed Database A database managed as a single system even though it includes many clients and many servers at both local and remote sites. A distributed database requires that data redundancy is managed and controlled.

Distributed Environment Refers to a network environment, or topology, in which decision making, file storage and other network functions are not centralized but instead are found through the network. This type of environment is typical for client-server applications and peer-to-peer architectures.

Distributed Feedback Laser DFB. A type of laser used in fiber-optic transmission systems, at the distribution level of the local loop. DFBs are point-to-point lasers distributed among nodes in a geographic area such a neighborhood. They transmit and receive optical signals between the distributed nodes and the centralized node, where the signals are multiplexed over a higher-speed fiber link to the head-end (point of signal origin). DFBs can be more effective than the traditional approach of using a single laser which serves multiple nodes through a broadcast approach, as the available bandwidth can be segmented. DFBs have application in a FTTN (Fiber-To-The-Neighborhood) local loop scenario. See also FTTN and SONET.

Distributed File System A type of file system in which the file system itself manages and transparently locates pieces of information from remote files and distributes files across a network. It can recognize multiple servers and be accessed independently of where it physically resides on the network.

Distributed Management Environment A compilation of technologies now being selected by the Open Software Foundation to create a unified network and systems management framework, as well as applications. Those technologies will complement OSF's own Unix implementation, OSF/1, as well as other operating systems.

Distributed Microprocessor Common Control In telephone systems, this means that the system employs many individual microprocessors to control system functions. The microprocessors may be located in central processing equipment or in the telephones themselves.

Distributed Name Service A technique for storing network node names so that the information is stored throughout the network (either one LAN or many joined together), and can be requested from, and supplied by, any node.

Distributed Network Service Introduced in March 1991, AT&T's Distributed Network Service was designed expressly for the switchless resale community unlike SDN. It allows resellers to purchase large volumes of services and receive progressive discounts on all direct dial domestic and international calls. Resellers may designate any number of locations to participate in the plan with the flexibility of adding locations.

Distributed Nodes PBX and its "slave" switches which are physically in separate buildings, in separate areas of the campus, in separate parts of the town.

Distributed Processing A network of computers such that the processing of information is initiated in local computers, and the resultant data is sent to a central computer for further processing with the data from other local systems. The term also covers computing jobs "farmed out" from a central site to remote processors where faster processing or specialized databases are available. Distributed processing is often a more efficient use of computer processing power since each CPU can be devoted to a certain task. A LAN is the perfect example of distributed processing. See also Distributed Data Processing.

Distributed Queue Dual Bus DQDB. A connectionless packet-switched protocol, normally residing in the Medium-Access Control sublayer of the data link layer. Definition from Bellcore in reference to Switched Multimegabit Data Service (SMDS). See also DQDB and SMDS.

Distributed Switching When electronics and computers were expensive it made sense to centralize them and run individual lines out for miles to subscribers. Then the economies changed. Electronics and computers became cheaper and running phone lines for miles became very expensive. So switching companies started building small switches which they could put closer to subscribers. Thus, individual local loops would be shorter and the long lines going back to the larger central office would be more efficiently used — namely by more people. The remote, or distributed switches, are called everything from remote switches to slave switches (because they slave off the main one which is distant). Usually these remote switches are unattended.

Distribution 1. The portion of a switching system in which a number of inputs is given access to an equal number of outputs.
2. Refers to the arrangement of premises wiring runs and their associated hardware required to implement the planned customer premises wiring system extending from the network interface jack to each communications outlet at the desktop.

Distribution Cable Part of the outside cable plant connecting feeder or subfeeder cables to drop wires or buried service wires that connect to the customer's premises. In simpler language, it's the cable from the serving area interface — a box on a pole, in the ground, etc. — to the lightning protection at the entrance to the customer's premises. See also Feeder Plant and Drop Wire.

Distribution Cable, Inside Plant Cables usually running horizontally from a closet on a given floor within a building. Distribution cables may be under carpet, simplex, duplex, quad, or higher fiber count cables.

Distribution Cable, Outside Plant The cable running from a central office or remote terminal to the side of a subscriber's lot.

Distribution Channel The route which the goods or title to the goods follow from the original supplier to the end user, determined by the type of trading parties, e.g. wholesaler, retailer, etc.

Distribution Duct A piece of rectangular metal or plastic within or just below the finished floor in your office or factory and used to extend AC power cables and telecommunications wires to a specific work area. Also called a raceway.

Distribution Frame Cables coming in from thousands of subscribers need to connect to the correct ports on a central office. Similarly, cables coming in from many PBX extensions need to connect to the PBX. The cables could be directly wired to the CO or to the PBX. This would be inflexible. It would make future moves and changes a nightmare. So the solution is something called a Distribution Frame. Basically it's a giant wire connecting device made of metal. There are no electronics in it whatsoever. On one side we punch down the wires coming in from the outside world. On the other side, we punch down the wires coming in from the CO or PBX. Both sides are connected with wire that's called "jumper" wire. By pulling off one end of the jumper wire and moving it to another location we can quickly change phone numbers, add or subtract cabling (one, two or three pairs for normal or electronic phones, etc.). In big central offices, distribution frames can span whole city blocks and the "jumper" wires can be several hundred yards long. Designing distribution frames and their layout in advance is critical, otherwise, it becomes a mess and tracing where jumper wires go becomes an enormously time consuming job.

Distribution Frequency The number of times used in the Internet for translating names of host computers into addresses. It is a network database system that provides translation between host names and addresses.

Distribution Group 1. A group made of phone extensions on a PBX arranged to share the load. In the Rolm PBX, each group is assigned a dummy extension number called a pilot number.
2. A group of telephone extensions on an automatic call distributor (ACD). The ACD answers the incoming calls then checks to see if any agents' phones are free. If none are free, it delivers the caller a message and then puts the caller on hold. Which line the call has come in on may determine which group of agents should handle that call. They would be called a Distribution Group. Once the call is released from hold, it may be sent to a mem-

ber of that Distribution Group following some pre-determined mathematical formula — for example, so that everyone's workload is kept constant, or a group of people are kept busy.

Distribution Rack A device used to mount communications equipment and cables.

Distribution Service In ISDN applications, a telecommunications service that allows a one-way of information from one point in the network to other points in the network with or without user individual presentation control. See Distribution Services.

Distribution Services In the world of B-ISDN (broadband ISDN) applications, distribution services are communications services that emphasize one-way, bandwidth-intensive transfer of information from one point in the network to other point(s) in the network. There are two classes of Distribution Services defined within this context, revolving around the issue of "Presentation Control:" Services requiring no presentation control include what we normally think of as broadcast services. Such services include such data as TV, Video On Demand (VOD), audio and multicast data. The data is broadcast or multicast across the network, with no requirement that the receiving device exercise any form of control over the transmission or presentation of the data. Services requiring presentation control include Interactive TV. While engaged in an Interactive TV session, a viewer might wish to control a TV broadcast in much the same way as he would control a videotape through a VCR remote control. While watching the Super Bowl, for instance, Ray Horak might wish to rewind and replay the touchdown scored by the Dallas Cowboys' Emmit Smith against the San Francisco 49'ers. Further, the viewer might wish to view that play from multiple angles covered by cameras positioned around the stadium. While the viewer is exercising these options, the live broadcast is buffered in large-scale temporary memory in the TV set of the future. Once the viewer has sufficiently relished the play, he can play rejoin the live broadcast, begin the program where he left off, or exercise other options. Harry Newton, on the other hand, might wish to exercise the same control over a tennis match broadcast from Australia.

Distribution Voltage Drop The voltage drop between any two defined points of interest in a power distribution system.

Distributor 1. A company with a contractual relationship with a manufacturer to buy equipment at a preset price. The manufacturer provides training, advertising and warranty support. Often called an authorized dealer, although a dealer may be one step lower in the distribution chain. A distributor is often used as a generic term for any supplier. Therefore you should clarify whether a distributor is an authorized distributor.

2. See Cross-connect.

DIT Directory Information Tree. The global tree of entries corresponding to information objects in the OSI X.500 Directory.

Dithering Dithering is an imaging term with at least two meanings. One meaning that is the processing of an image containing more colors than a system can handle to an image containing exactly the right number of colors that the system can handle. For example, some of the color images on my laptop contain 16 million colors. But my laptop (the way I have it set up) will only handle 256 colors. If I ask my image display software to display that image, it will "dither" it to 256 colors. This means it will give its best shot guess at what the image should look like.

In another meaning, dithering is patterning black and white dots to approximate shades of grey on a scanned image.

Diurnal Phase Shift The phase shift of electromagnetic signals associated with daily changes in the ionosphere. The major changes usually occur during the period of time when sunrise or sunset is present at critical points along the path. Significant phase shifts may occur on paths wherein a reflection area of the path is subject to a large tidal range. In cable systems, significant phase shifts can be occasioned by diurnal temperature variance. See also Diurnal Wander and Wander.

Diurnal Wander A loss of signal synchronization in digital cable systems caused by temperature variations over the course of 24 hours. (Diurnal means "daily cycle.") As the ambient temperature varies from the heat of the day to the cool of the night, the cable stretches and contracts, with the overall length of the cable changing, if only ever so slightly. As the length of the medium changes, the speed of signal propagation (the time it takes for the signal to transverse the cable) is affected. As a result, the number of digital pulses effectively stored in the medium changes. The end result is that the network elements (e.g., repeaters and multiplexers) can get out of synch. Diurnal wander affects all types of cable systems — twisted pair, coax cable, and optical fiber; it especially affects cables hung from poles, rather than buried, as such cables are more exposed to temperature variations and as the weight of the cable adds to the problem. The impacts of diurnal wander are particularly great in very high-speed transmission systems. See also Diurnal Phase Shift and Wander.

Diverse Entry You have a building with phone service. You are concerned about the reliability of your phone service. You are concerned that the wires coming in from your phone company might be cut. So you organize to have service coming in from the phone company along different routes and entering your building from opposite sides of your building. Thus the term diverse entry.

Diversity 1. In microwave communications, the strength of a microwave signal can decrease for many reasons — heat, rain, fog, etc. This is not good if the objective is to get reliable communications. One solution is to simultaneously send and receive two microwave signals at slightly different frequencies. Since different frequencies respond differently to weather problems, the likelihood is that at least one will get through well. This is called diversity.

2. A means of effecting redundancy in a network, with the result being protection from catastrophic failure. Consider the typical end user — one cable entrance to one group of wire pairs housed in one cable connected to one central office provided by one local exchange carrier and connecting to one interexchange carrier. That is a catastrophe waiting to happen. Consider the alternative of full diversity. The fully redundant end user has several cable entrances into the building — this is Entry Diversity. The local loop connection is provided through multiple, non-adjacent pairs in multiple cables — this is Pair and Cable Diversity. The several cables follow different routes to the CO — this is Route Diversity. The local loops terminate in multiple COs — this is Central Office Diversity. The carrier connection is to multiple LECs and IXCs — this is Carrier Diversity. In this scenario of full diversity, no single point of failure can totally isolate the user organization from the network. Diversity is good — perhaps expensive and complex, but good.

Diversity Combiner A circuit or device for combining two or more signals carrying the same information received via separate paths or channels with the objective of providing a single resultant signal that is superior in quality to any of the contributing signals.

Diversity Receive A method commonly employed by cellular manufacturers to improve the signal strength of received signals. Uses two independent antennas that receive signals which differ in phase and amplitude resulting from the slight difference in antennas position. These two signals are either summed or the strongest is accepted by voting. The most popular methods include dual-antenna phase switching, dual-receiver audio switching and "ratio diversity" audio combining. The most effective method is ratio diversity combining.

Divestiture On January 8, 1982 AT&T signed a Consent Decree with the U.S. Department of Justice, stipulating that on midnight December 30, 1983, AT&T would divest itself of its 22 telephone operating companies. According to the terms of the Divestiture, those 22 operating Bell telephone companies would be formed into seven regional holding companies of roughly equal size. Terms of the Divestiture placed business restrictions on the BOCs. Those restrictions were threefold: The BOCs weren't allowed into long distance, equipment manufacturing, or information services. In for the divestiture, AT&T would be allowed into the manufacture of computers. It had been restricted previously by the 1956 Consent Decree. See also Lucent Technologies.

Divx A new DVD (Digital Video Format) format that supports encryption and timed rentals. Divx is essentially a more expensive version of DVD. The foremost difference between it and standard DVD is the disk's encryption technology. The second difference is the way the Divx system allows for an on-demand viewing experience. Divx disks require a Divx player, which will sell for about $100 more than the price of a standard DVD player, and which will also play standard DVD disks and audio CDs. Users buy a Divx disk for about $5, and can watch it as many times as they like for a two-day period; the period begins when they first hit "play" on the Divx player. After the initial two-day viewing period, customers can play the disk at a much later time by just paying a fee. Moviephiles can also buy a special password to gain unlimited playback of the movie. Future viewings are billed in two-day periods, just like the initial viewing. The player keeps track of the number of periods the consumer has used and transmits this information over a household phone line to the consumer's account; the consumer then receives a bill in the mail. This system includes the key characteristics of the video rental model, like convenience, variety and low cost, but with important advantages. For example, the user never has to return the disks so, there are never any late fees. "It basically moves DVD technology into the rental domain," said one observer at the time of the announcement of the Divx technology in the fall of 1997.

DIW Type D Inside Wire. Originated as a specific AT&T cable. Now commonly used to describe any 22, 24, or 26 gauge PVC jacketed twisted-pair cable used primarily for inside telephony wiring.

DIX Digital/Intel/Xerox. The early 1980s consortium of manufacturers that promoted the Ethernet Version 1 and Ethernet Version 2 variations of a CSMA/CD media access protocol. This DIX "standard" was then submitted to the IEEE, where after some modifications

names: 7-unit ARQ Code, Moore ARQ Code, Moore Code, RCA Code, and others.

International Telegraph Alphabet #5 ITA 5. World-standard CCITT version of a 7-unit teleprinter code with an 8th parity bit also used for asynchronous data terminals such as minicomputers or PCs. Colloquial name: ASCII code.

International Telephone Address A four-part code specifying a unique address for any telephone company in the world.

International Toll Free Service See IFTS.

International Wireless Telecommunications Association See IWTA.

Internet It is very hard to define the Internet in a way that is either meaningful or easy to grasp. To say the Internet is the world's largest computer network is to trivialize it. But it is. And it is undoubtedly the most important happening to the computing and communications industries since the invention of the transistor. The Internet has its roots as a cooperative research effort of the United States Federal Government known as the Advanced Research Project Agency NETwork (ARPAnet), which was established in 1969 by the Defense Department. ARPAnet tied universities and research and development organizations to their military customers, and provided connectivity to a small number of supercomputer centers to support timesharing applications. Much of the funding was provided by NSFNET (National Science Foundation NETwork). More recently, the Internet has been commercialized, extending its use to anyone with a PC, a modem, a telephone line and an access provider — a special company known as an Internet Service Provider or Internet Access Provider, who allows their customers to reach the Internet via dial-up or dedicated line. The Internet has become a major new publishing, research and commerce medium. I believe that its invention is as important to the dissemination of knowledge, to peoples' life styles and to the way we'll be conducting business in coming years as the invention of the Gutenberg Press was in 1453.

At its heart, the Internet is many large computer networks joined together over high-speed backbone data links ranging from 56 Kbps (now rare) to T-1, T-3, OC-1 and OC-3. The Internet, in short, is a network of computer networks. The Internet now reaches worldwide. Depending on the whim of the local government (which typically controls the local phone company and thus access to the Internet for its citizenry) you can pretty well get onto the Internet and roam it unchecked. The governments of Singapore, the People's Republic of China, Burma and few others limit their peoples' access.

The topology of the Internet and its subnetworks changes daily, as do its providers and its content. The bottom line is that the makeup of the Internet — i.e. how it works — is not all that important. It is the applications and information available on it that are important — the most significant of which are e-mail (electronic mail) and the World Wide Web. Commercial networks from AT&T, MCI, SPRINT, Worldcom and many others now carry the bulk of the traffic. As NSFNET no longer funds the Internet, it has been commercialized, with money changing hands in complex ways between users, companies with Web sites, Internet Access Providers, long distance providers, government, universities and others. The Internet remains supported by some level of public funding, although it is less direct that in the past. Increasingly, businesses are joining their computers to the Internet. According to Network Wizards (www.nw.com), as of year end 1996 the Internet linked over 60,000 networks, 9.5 million computers and 35 million users in 150 countries. The commercialization of the Net has led to exponential growth in both the number of connected hosts and the overall volume of traffic, creating bottlenecks. As a result, a large number of research universities have begun the development of Internet II, also known as Internet2, which effectively is a separate Internet for colleges, universities and government organizations. In other words, the organizations which founded the original Internet are getting off it in favor of building their own Internet.

The Internet's networking technology is very smart. Every time someone hooks a new computer to the Internet, the Internet adapts that hookup as its own and begins to route Internet traffic over that hookup and through that new computer. Thus as more computers are hooked to the Internet, its network (and its value) grows exponentially. The Internet is basically a packet switched network based on a family of protocols called TCP/IP, which stands for Transmission Control Protocol/Internet Protocol (TCP/IP), a family of networking protocols providing communication across interconnected networks, between computers with diverse hardware architectures and between various computer operating systems. Most PCs, including Windows-based machines and Macintoshes, will happily communicate using TCP/IP.

How TCP Works: TCP is a reliable, connection-oriented protocol. Connection-oriented implies that TCP first establishes a connection between the two computer systems that intend to exchange data (e.g. your PC and the host computer you're trying to reach, which may be thousands of miles away). Since most networks are built on shared media (for example, several systems sharing the same cabling), it is necessary to break chunks of data into manageable pieces so that no two communicating computers monopolize the network. These pieces are called packets. When an application sends a message to TCP for transmission, TCP breaks the message into packets, sized appropriately for the network, and sends them over the network. Because a single message is often broken into many packets, TCP marks these packets with sequence numbers before sending them. The sequence numbers allow the receiving system to properly reassemble the packets into the original original order, i.e. the original message. TCP checks for errors. And finally, TCP uses port IDs to specify which application running on the system is sending or receiving the data. The port ID, checksum, and sequence number are inserted into the TCP packet in a special section called the header. The header is at the beginning of the packet containing this and other "control" information for TCP.

How IP Works: IP is the messenger protocol of TCP/IP. The IP protocol, much simpler than TCP, basically addresses and sends packets. IP relies on three pieces of information, which you provide, to receive and deliver packets successfully: IP address, subnet mask, and default gateway. The IP address identifies your system on the TCP/IP network. IP addresses are 32-bit addresses that are globally unique on a network. There's much more on TCP/IP in my definition on TCP/IP and on Internet Addresses in that definition.

Here's how the Internet is used: As a computer network joining two (or more) computers together in a session, it is basically transparent to what it carries. It doesn't care if it carries electronic mail, research material, shopping requests, video, images, voice phone calls, requests for information, faxes ... or anything that can be digitized, placed in a packet of information and sent. A packet-switched network like the Internet injects short delays into its communications as it disassembles and assembles the packets of information it sends. And while these short delays are not a problem for non-real time communications, like email, they present a problem for "real-time" information such as voice and video. The Internet can inject a delay of as much as half a second between speaking and being heard at the other end. This makes conversation difficult. Internet telephony, as it's called when it runs on the Internet, is getting better, however, as the Internet improves and voice coding and compression techniques improve. I've enjoyed some relatively decent conversations to distant places in recent months.

See various Internet definitions following. See also Domain, Domain Naming System, gTLD, ICANN, Internet2, Internet Appliance, Internet Protocol, Internet Telephony, Intranet, IP Telephony, Surf, TCP/IP and Web Browser.

Internet Access The method by which users connect to the Internet, usually through the service of an Internet Service Provider (ISP).

Internet Access Provider See IAP.

Internet Address When you travel the Internet or its World Wide Web area, you need an address to get to where you want to go — just like you need an address on a letter you mail or a phone number you wish to reach. All Internet addresses are expressed in dotted decimal notation of four fields of eight bits. In binary code, each bit has two possible values, 0 or 1. Therefore, each 8-bit field yield two to the eighth power, or 256 possible combinations. Since one of the possible combinations is 000, which means nothing, it is not used, thereby leaving 255 possible numbers in each field. IP addresses are written as XXX.XXX.XXX.XXX, where X is any number between 0 and 9, and where each 3-digit field has a value between 001 (i.e., 1) and 256. Internet addresses currently are based on the IPv4 (Internet Protocol version 4 protocol), which uses a 32-bit code in the 20-octet IP header to identify host addresses. A 32-bit address field yields 2 to the 32nd power possible addresses — that's 4,294,967,296 addresses. that seems like a lot of addresses, but it's not enough in the context of the commercialized Internet. Note that IPv6 has been standardized by the IETF (Internet Engineering Task Force), but has yet to be widely implemented, as equipment upgrades generally are required. Among the advantages of IPv6 is an address field expanded to 128 bits. A 128-bit address field yields 2 to the 128 power addresses — that's
340,282,366,920,939,463,463,374,607,431,768,211,456 distinct addresses. That's enough for approximately 32 addresses for every square inch of dry land on the Earth's surface, which should be enough for a while. No one wants to remember all those numbers when they go checking out their favorite site. So they came up with a neat idea of naming sites and having a bunch of computers do the translation, very similar to what happens with 800 toll-free numbers in North America. As a result Web URLs (Uniform Resource Locators) and e-mail addresses (such as www.harrynewton.com and harry@har-

rynewton.com) are textual addresses that are translated into correlating IP addresses through DNSs (Domain Name Servers, i.e. dedicated translation computers), which maintain tables of both domain names and IP addresses. For example, if you wish to reach www.Javanet.com, you can type www.Javanet.com in your browser or you can simply type 209.94.128.8. But www.Javanet.com is easier to remember. Internet addresses are organized into hierarchical "classes," as follows:
Class A Addresses: Begin with a "0" bit. Of a possible 128 Class A networks, only 51 networks exist. Examples include General Electric Company, IBM Corporation, AT&T, Hewlett-Packard Company, Ford Motor Company, and the Defense Information Systems Agency. They all are huge organizations, and require the highest possible categorization.
Class B Addresses: Begin with a "10" bit sequence. Of a possible 65,536 Class B networks, only about 12,000 exist.
Class C Addresses: Begin with a "110" binary bit sequence. Most applicants are assigned Class C addresses in blocks of 255 IP addresses. As of January 1998, about 800,000 Class C addresses were assigned.
Class D Addresses: Begin with a "1110" bit sequence. They are intended for multicast purposes.
Class E Addresses: Begin with a "1111" bit sequence. They are reserved for future use.
Now, the term "Internet Address" can be a bit misleading. As we have seen, it actually refers to an "IP Address," unless it's a URL, of course. Even if it's a URL, it's translated into an IP address. IP addresses often are used in the LAN (Local Area Network), as well as in the Internet and other public packet data networks. In such a case, one IP address often is used internal to the LAN domain, and another in the Internet domain, in order to mask the internal IP subnet address from the outside world. Masking the internal IP address essentially "masks," or hides, the true IP address of your workstation from the outside world. You may do this for one simple reason — you don't want the outside world to be able to get to your PC. The internal IP address might be either IPv4 or IPv6, while the Internet "outside world" address currently is always IPv4. In either event, the IP addresses are translated, one to the other, through a process of NAT (Network Address Translation), which is accomplished in an access router. On the outbound side, your true IP address is translated into an Internet IP address associated with the router. Responses to your transmissions are addressed to the router, which then translates them back into your true IP address for successful delivery. This translation and masking process secures and protects your identity. See NAT for a full explanation of this process. See also Subnet Mask.

Internet Appliance A sub-$500 machine specially designed for Internet browsing and first proposed in the late Fall of 1995 by Larry Ellison, head of database software company Oracle. Part of its appeal to people outside Microsoft and Intel is that the Internet Appliance would not have to be based on standard PC technology. It need have an Intel chip and need not run Windows. This device is also called an Internet Terminal, a Network Computer or an IPC, an Interpersonal computer. The original description of the Internet Appliance was that it would come with 4mb of RAM, 4mb of flash memory, processor, monitor, keyboard and mouse — all for under $500.

Internet Architecture Board The Internet Architecture Board (IAB) is a technical advisory group of the Internet Society. Its responsibilities include:
IESG Selection: The IAB appoints a new IETF chair and all other IESG candidates, from a list provided by the IETF nominating committee.
Architectural Oversight: The IAB provides oversight of the architecture for the protocols and procedures used by the Internet.
Standards Process Oversight and Appeal: The IAB provides oversight of the process used to create Internet Standards. The IAB serves as an appeal board for complaints of improper execution of the standards process.
RFC Series and IANA: The IAB is responsible for editorial management and publication of the Request for Comments (RFC) document series, and for administration of the various Internet assigned numbers.
External Liaison: The IAB acts as representative of the interests of the Internet Society in liaison relationships with other organizations concerned with standards and other technical and organizational issues relevant to the world-wide Internet.
Advice to ISOC: The IAB acts as a source of advice and guidance to the Board of Trustees and Officers of the Internet Society concerning technical, architectural, procedural, and (where appropriate) policy matters pertaining to the Internet and its enabling technologies.

Internet Assigned Numbers Authority IANA. This group is responsible for the assignment of unique Internet parameters (e.g., TCP port numbers, and ARP hardware types), and managing domain names. It also was responsible for administration and assignment of IP (Internet Protocol) numbers within the geographic areas of North America, South America, the Caribbean and sub-Saharan Africa; on December 22, 1997, that responsibility was shifted to ARIN (American Registry for Internet Numbers). www.arin.net. The IANA has well-established working relationships with the US Government, the Internet Society (ISOC), and the InterNIC. ISOC provides coordination of IANA activities with the Internet Engineering Task Force (IETF) through the participation of IANA in the Internet Architecture Board (IAB). IANA responsibility was assigned by DARPA (Defense Advanced Research Project Agency) to the Information Sciences Institute (ISI) of the University of Southern California. ISI has discretionary authority to delegate portions of its functions to an Internet Registry (IR), previously performed by SRI International and currently performed by Network Solutions Inc. (NSI), a subsidiary of SAIC. Beginning March 1998, that function is shared with the Council of Registrars (CORE). CORE contracted (November 1997) with Emergent Corporation to build and operate the new Internet Name Shared Registry System (SRS), which is a neutral, shared database repository that coordinates registrations from CORE and propagates those names to the global Internet Domain Name System (DNS). www.isi.edu/div7/iana/ See also ARIN, CORE, DNS, Internet, InterNIC, and SRS.

Internet Backbone This super-fast network spanning the world from one major metropolitan area to another is provided by a handful of national Internet Service Providers (ISPs). These companies and organizations use connections running at approximately 45 Mb per second (T-3 lines) linked up at specified interconnection points called national access points. Local ISPs connect to this backbone through routers so that data can be carried though the backbone to its final destination. See also MAE.

Internet Cable Access A general term used to describe accessing the Internet using the cable TV coaxial cable for inbound Internet access (i.e. downstream) and the phone line for up sending commands and requests (i.e. upstream information). The cable TV is very fast — as much as six million bits per second. The phone is relatively slow — no more than fifty thousand bits per second. But it works because most information from the Internet flows at you, not away from you. The cable and telecom industry is working on standards to make disparate cable systems and TV set-top boxes work with each other. The industry has developed Data Over Cable Service Interface Specification (DOCSIS), which sets standards for both two-way and cable-plus-phone specifications. See DOCSIS.

Internet Cache Protocol See ICP.

Internet Call Waiting Imagine you have one phone line at your house. You're presently using that one line to surf the Internet. Someone calls you. You have installed call forwarding. Their incoming call gets forwarded to another phone line, which is answered by a service provider who is providing the Internet call waiting service. Their machine answers: "The number you called is presently surfing the Internet. Would you like to tell them you're calling? Do you have a message? Record now." The machine picks up the incoming phone line from callerID, records the message and then sends an email to you, saying this phone number is trying to reach you. And here's their message." It then plays the message.

Internet Content Provider ICP. A company that will design and deliver content for your Web site.

Internet Control Message Protocol ICMP. The protocol used to handle errors and control messages at the IP player. ICMP is actually part of the IP protocol.

Internet Engineering Steering Group IESG. The executive committee of the IETF (Internet Engineering Task Force).

Internet Engineering Task Force IETF. One of two technical working bodies of the Internet Activities Board. The IETF is the primary working body developing new TCP/IP (Transmission Control Protocol/Internet Protocol) standards for the Internet. It has more than one thousand active participants. www.ietf.org

Internet Fax Internet fax is, as it sounds, sending faxes over the Internet. There are a whole bunch of manual ways to send faxes over the Internet — most of which are akin to sending a fax over the PSTN, as we do it today. Dial up, etc. There are movements, however, to automate this process and get Internet faxing more along the lines of Internet email. Internet Fax is coming in two parts. The first is a store and forward model that is essentially based on the MIME attachment of TIFF files to standard E-Mail messages delivered by SMTP. The standards for this model are found in the IETF - ITU agreements of January 1998. The second part is an Internet draft that extends SMTP itself. The draft turns a fax machine into a virtual SMTP server so that transmission of the fax from point-to-point happens in real time. The protocol would extend SMTP beyond its function of a simple mail transport protocol to the point where, when a transport session is established, the user can

exchange capabilities between devices - something that cannot be done with store and forward mail. Implementing these will be a series of hybrid "stupid-smart" devices that bridge faxes between the PSTN and the Internet. The Panasonic FO-770I, which is already on the market, is one such device with almost all the capabilities of the new standard . Load your fax, toggle "send" in one direction to transmit via the PSTN, toggle "send" in the other direction to go via the Internet. Other manufacturers are working on the introduction of inexpensive "black boxes" to connect standard G3 faxes in small-office, home-office (SOHO) environments directly to one's PC and from there to the Internet.

Internet Firewall See Firewall.

Internet Gateway Internet gateways are devices which typically sit on a local area network and handle all the translations between IPX traffic on your LAN (IPX is the NetWare protocol) and the TCP/IP traffic on the Internet. TCP/IP is the protocol used on the Internet. See also Internet Servers and other definitions beginning with Internet.

Internet Group Name In Microsoft networking, a name registered by the domain controller that contains a list of the specific addresses of computers that have registered the name. The name has a 16th character ending in 0x1C.

Internet Integrator A fancy name for a consulting firm which specializes in helping its clients do stuff with the Internet, including transaction processing; supply chain infrastructure integration; wireless integration; business to business (B2B) and application monitoring/management.

Internet Intellectual Infrastructure Fund A fund created in 1995 to offset government funding for the preservation and enhancement of the intellectual infrastructure of the Internet. The fund was funded by 30% of the Internet domain registration fee, which was set at $50 per year at that time. On March 16, 1998, the funding for the Intellectual Infrastructure was completed, and the InterNIC ceased to collect that portion of the annual fee, thereby reducing it to $35 for new registrations. Proceeds of the fund are to be used to build Internet2, which will be a separate Internet for institutions of higher learning. See also CORE, DNS and InterNIC.

Internet Mail Consortium IMC. A technical trade association which pursues cooperative promotion and enhancement of electronic mail and messaging on the Internet. Activities cover promotion of Internet mail and the products and services which serve to implement it. IMC is involved in formative efforts for IETF (Internet Engineering Task Force) mail standards, with a focus on implementation guidelines. (www.imc.org)

Internet MIB Subtree A tree-shaped data structure in which network devices on a local area network and their attributes can be identified within the confines of a network management scheme. The name of an object or attribute is derived from its location on this tree.

For example, an object in MIB-I might be named 1.2.1.1.1.0. the first 1 indicates the object is on the Internet. The 2 denotes that it falls within the Management category. The second 1 shows the object is part of the first fully defined MIB, known as MIB-I. The third 1 indicates which of the eight object groups is being referenced. And the fourth 1 is a textual description of the network component. The 0 indicates there is only one object instance. An object instance links a particular object to a specific node on the network. The numbering system is infinitely extendible to accommodate additions to this base identification scheme. This common naming structure permits equipment from a variety of vendors to be managed by a single management station that uses SNMP. The four main categories of the tree are Directory, Management, Experimental and Private/Enterprises.

Internet Number The dotted-quad address used to specify a certain system. The Internet number for cs.widener.edu is 147.31.130. A resolver is used to translate between hostnames and Internet addresses.

Internet Numbers Registry IR. The officially designated organization responsible for the assignment of IP addresses, the IR assigns unique URLs (Uniform Resource Locators), which are translated into IP addresses through a resolver. IR is a responsibility of the IANA (Internet Assigned Numbers Authority), a function assigned to the Information Sciences Institute (ISI) of the University of Southern California. In accordance with its discretionary authority, ISI initially delegated that responsibility to SRI International and, subsequently, to Network Solutions Inc. (NSI). Beginning March 1998, NSI shares that responsibility with CORE and Emergent Corporation, which administers the Shared Numbers Registry (SRS). See also CORE, IANA, SRS, and URL.

Internet Offloading Internet offloading is a term used to describe Internet data traffic from a carrier's telephone voice switch and process it on a separate data switch or other equipment, in order to get rid of the Internet-bound traffic and handle that data more cheaply. Here's the logic: A normal central office telephone switch is designed to handle voice phone calls, each averaging three minutes. Pricing is done to accommodate this pattern. After the Internet became very popular, the manager of my local phone company complained to me that his average phone call had now risen to one hour (from three minutes) and this was "killing him." He had been forced to put in more capacity, even though he wasn't getting paid any more money.

Internet Open Trading Protocol IOTP. An interoperable framework for Internet commerce, IOTP was developed by the Open Trading Protocol Consortium, and has been accepted by the Internet Engineering Task Force (IETF) for standards development. IOTP is intended to be independent of any underlying electronic payment systems, such as SET (Secure Electronic Transaction), Mondex, CyberCash, and DigiCash. According to the IETF, a "fundamental ideal of the IOTP effort is to produce a definition of these trading events in such a way that no matter where produced, two unfamiliar parties using electronic commerce capabilities to buy and sell that conform to the IOTP specifications will be able to complete the business safely and successfully."

Internet Packet Exchange IPX. Novell NetWare's native LAN communications protocol, used to move data between server and/or workstation programs running on different network nodes.

Internet Peering See Peering.

Internet Plumbers Internet plumbers are the companies who make the equipment that makes up the Internet's infrastructure, such as the routers and the servers. They include Cisco, IBM, Lucent and Sun.

Internet Print Server An Internet print server allows anyone to print a document on any printer on the Internet with the same ease as printing on a printer attached to the PC. Internet Printing is just like e-mail, Internet faxing, Internet Telephone and Video. It is a new method of data streaming through the Internet, that will further open up the Internet for new applications. Black Ice Software, was the first company to announce an Internet print server, www.blackice.com.

Internet Protocol IP. Part of the TCP/IP family of protocols describing software that tracks the Internet address of nodes, routes outgoing messages, and recognizes incoming messages. Used in gateways to connect networks at OSI network Level 3 and above. See Internet, Internet Protocol Address and TCP/IP.

Internet Protocol Address Also called IP Address. It's a unique, 32-bit number for a specific TCP/IP host on the Internet. IP addresses are normally printed in dotted decimal form, such as 128.127.50.224. Once your domain is assigned a group of numbers by the Internet's central registry, it can house one or several domains and/or hosts, i.e. computertelephony.com and teleconnect.com. People looking for those domains will be pointed to that server where they will find all information in the domain — perhaps a home page, or a place to leave e-mail, etc. There are three classes of IP address A, B, and C — the most common of which is a class "C" address block. A class "C" address block can address about 256 hosts (e.g., 128.10.10.*). a class "B" address block can contain about 256*256 (e.g., 128.10.*.*) hosts. Some ip addresses are reserved for broadcasts in respective domains. See Domain and Internet.

Internet Protocol Datagram The fundamental unit of information passed across the Internet. Contains source and destination addresses along with data and a number of fields which define such things as the length of the datagram, the header checksum, and flags to say whether the datagram can be (or has been) fragmented, This is a self-contained packet, independent of other packets.

Internet Protocol Suite The TCP/IP suite of network protocols which were mandated for use in the Internet in 1983. The suite includes the following protocols (and the Layer at which each functions in the context of the OSI Reference Model): IP, or Internet Protocol (Layer 3); TCP, or Transmission Control Protocol (Layer 4); UDP, or User Datagram Protocol (Layer 7); FTP, or File Transfer Protocol (Layer 7); TELNET, or TELecommunications NETwork (Layer 7); SMTP, or Simple Mail Transfer Protocol (Layer 7); and SNMP, or Simple Network Management Protocol (Layer 7). See the definitions of these terms for much more detail.

Internet Radio As I write this, I am wearing headphones plugged into my laptop listening to Klassik Radio from Hamburg, Germany. The music is wonderful. The clarity is perfect. How does this work? The "radio station" simply sets up a web server attached to the Internet. Instead of putting up text and pictures like other web sites do, it puts up its "radio station." That radio station may be programming its broadcasting over the air in Hamburg, or it may be programming by just specially putting the material up on he web site. That station might also give you its program. How do I listen to Internet radio broadcasts? Most internet radio broadcasts are easily accessible using your web browser and

either RealPlayer (from www.Real.com) or Windows Media Player, which comes with Microsoft's browser Internet Explorer. Both of these softwares come with preloaded addresses for interesting Internet radio stations. But you can find thousands more by searching on Web for "Internet Radio." There are four neat things about Internet radio: The quality is perfectly fine on a dial connection; there's a huge variety of available radio stations (at least several thousand), enough to satisfy anyone's taste; it's all free and fourth, when you log onto many of the stations, a screen may pop up giving you the Radio's program. Internet Radio is one of the Internet's enormous benefits.

Internet Registry Activities involved in the administration of generic Top Level Domains (gTLDs) in the CORE (Council or REgistrars) Domain System. Such activities comprise all the services needed for assignment and maintenance of Internet domain names. As many as 90 registrars will be authorized by CORE as registrars to administer and maintain the new gTLDs: .arts, .firm, .info, . nom, .rec, .shop and .web. InterNIC historically has been primarily responsible for the assignment, administration and maintenance of a subset of the traditional gTLDs, specifically, .com, .edu and .org. Future responsibility for those traditional gTLDs is uncertain. See also CORE, DNS, gTLD and InterNIC.

Internet Relay Chat IRC. Sort of like CB radio, but run on the Internet, and far more confusing than CB radio.

Internet Research Task Force IRTF. An Internet organization that creates long- and short-term research groups concentrating on protocols, architecture, and technology issues. For more information on IRTF, see www.irtf.org.

Internet Router see Router.

Internet Security Information traveling on the Internet usually takes a circuitous route through several intermediary computers to reach any destination computer. The actual route your information takes to reach its destination is not under your control. As your information travels on Internet computers, any intermediary computer has the potential to eavesdrop and make copies. An intermediary computer could even deceive you and exchange information with you by misrepresenting itself as your intended destination. These possibilities make the transfer of confidential information such as passwords or credit card numbers susceptible to abuse. This is where Internet security comes in and why it has become a rapidly growing concern for all who use the Internet. See the Internet and Secure Channel.

Internet Server 1. An Internet server is a device which users on the Internet access to get services. Such services might be electronic mail, news, a Web page, etc. A company will have one or more Internet servers attached to the Internet when it wants to deliver services to people on the Internet. Such Internet servers could be called e-mail servers, FTP servers, News servers and World Wide Web servers. Internet servers most commonly run on Unix. But Microsoft Windows NT is increasingly gaining popularity.
2. A Sun Microsystems term, Part of Solaris' Server Suite. Provides secure, scalable workgroup-based Internet computing.

Internet Server API See ISAPI.

Internet Service Provider ISP. A vendor who provides access for customers (companies and private individuals) to the Internet and the World Wide Web. The ISP also typically provides a core group of internet utilities and services like E-mail, News Group Readers and sometimes weather reports and local restaurant reviews. The user typically reaches his ISP by either dialing-up with their own computer, modem and phone line, or over a dedicated line installed by a telephone company. An ISP is also called a TSP, for Telecommunications Service Provider, and a ITSP, for Internet Telephony Service Provider.

Internet Society ISOC. A non-profit organization that fosters the voluntary interconnection of computer networks into a global communications and information infrastructure. According to Computerworld, the Internet Society is concerned with the evolution of the Internet and its social, political and technical issues. The ISOC is the umbrella organization for the IAB, IETF and IRTF. The ISOC has 5,000 members in 120 countries. Its Web site is www.isoc.org. See also IOPS and NANOG.

Internet Telephony In the very beginning, Internet telephony simply meant the technology and the techniques to let you make voice phone calls — local, long distance and international — over the Internet using your PC. To make these calls, both people on the phone need appropriate hardware and software. The hardware is typically a sound card or voice modem in a PC. There are almost as many ways of making phone calls on the Internet as there are software packages. The key is to figure a way that your PC can dial and reach someone else's distant PC — which must be turned on, plugged in and connected to some place that my PC can find you at. In short, making voice phone calls was the first definition of Internet telephony. But then people started thinking of other things Internet telephony could become. For example, Internet telephony could let you talk to someone while the two of you worked on making perfect a document that was on both your screens. If the Internet could send email, people started thinking of sending fax, voice, video and imaging mail/messages. And maybe, as you cruise the Internet and find a product you'd like to buy, you might see a button that says "I'd like to know more. Have an operator call me." So you click the button, and 15 seconds later your phone rings. The operator is calling, wanting to know how he can help? In short, the definition of Internet telephony is broadening day by day to include all forms of media (voice, video, image), all forms of messaging and all variations of speed from real-time to time-delayed. See Gold, Packet Switching, Tier 1 and, for the best explanation, TAPI 3.0.

Internet Terminal A sub-$500 machine specially designed for Internet browsing and first proposed in the late Fall of 1995 by Larry Ellison, head of database software company Oracle. Part of its appeal to people outside Microsoft and Intel is that the Internet Appliance would not have to be based on standard PC technology. It need have an Intel chip and need not run Windows. This device is also called an Internet Terminal, a Network Computer or an IPC, an Interpersonal computer. The original description of the Internet Appliance was that it would come with 4mb of RAM, 4mb of flash memory, processor, monitor, keyboard and mouse — all for under $500. Also called a NC, or Network Computer.

Internet Worm This software program caused a major part of the Internet network to crash by replicating and generating spurious data.

Internet2 The next generation Internet, replacing the current Internet exclusively for the use of member universities, Internet2 is a project of the University Corporation for Advanced Internet Development (UCAID). As a result of the deteriorating performance of the Internet, 34 U.S. universities announced in October 1996 the formation of Internet2. Subsequently, the central goals of the project were adopted as part of the Clinton administration's Next Generation Initiative (NGI). This second version of the Internet is a collaboration of the National Science Foundation (NSF), the U.S. Department of Energy, over 110 research universities, and a small number of private businesses. Each participating university has committed at least $500,000 to fund the project. Intended to serve as a private Internet for the exclusive use of its member organizations, it will be separate from the traditional Internet. The network eventually will operate over fiber optic transmission facilities at speeds of up to 2.4 Gbps (SONET OC-48), although current speeds of connection are at 155 Mbps (OC-3) and 622 Mbps (OC-12). Internet2 will connect through gigiPOPs, switches with throughput in the range of billions of packets per second, and will run the IPv6 protocol. www.internet2.edu. See also Internet.

InternetPBX Device made by COM2001.com of San Diego. The InternetPBX is a PC with voice cards See the July 24, 2000 US Newswire (I accessed it from Lexis-Nexis.com, a pay service) for a reference to the term, "InternetPBX"
"Major players like Bill Gates and Michael Dell are already talking about InternetPBX, and the exciting future of Voice over IP (VoIP) and Web-based NT telephony solutions"
-Donovan

Internetwork See Internetworking.

Internetwork Management A generic term used to describe the actions that help maintain, a complex network.

Internetwork Operating System IOS. Cisco's massive operating system that runs most routers on the Internet.

Internetwork Packet Exchange IPX. A network layer protocol developed by Novell and used in NetWare implementations. See IPX.

Internetwork Router In local area networking technology, an internetwork router is a device used for communications between networks. Messages for the connected network are addressed to the internetwork router, which chooses the best path to the selected destination via dynamic routing. Internetwork routers function at the network layer of the Open Systems Interconnection (OSI) model. Also known as a network router or simply as a router.

Internetworking 1. Communication between two networks or two types of networks or end equipment. This may or may not involve a difference in signaling or protocol elements supported. And, in the narrower sense — to join local area networks together. This way users can get access to other files, databases and applications. Bridges and routers are the devices which typically accomplish the task of joining LANs. Internetworking may be done with cables — joining LANs together in the same building, for example. Or it may be done with telecommunications circuits — joining LANs together across the globe.

InterNIC Internet Network Information Center. The InterNIC registry is where you

always have a slave connection with a LocDev. requestor An entity that requests information from another entity via the Bluetooth API.

Remind Delay The period of time from when a call is put on hold to when a reminder tone is heard and a message appears on the telephone display.

Remission IBM-speak to change the mission of a product or a facility.

Remodulator In a split broadband cable system, a digital device at the headend that recovers the digital data from the inbound analog signal and then retransmits the data on the outbound frequency.

Remote Pertaining to a system or device that is accessed through a telephone line. The opposite is local. See Remote Access and RAS.

Remote Access Sending and receiving data to and from a computer or controlling a computer with terminals or PCs connected through communications (i.e. phone) links.

Remote Access Concentrator See RAC.

Remote Access Device RAD. Typically, a remote access device (also called a Remote Access Server) is a piece of computer hardware which sits on a corporate LAN and into which employees dial to get access to their files and their email. Remote access devices are also used by commercial service providers, such as Internet Access Providers (ISPs) to allow their customers access into their networks. For longer explanations, see also Remote Access Server and Universal Edge Server.

Remote Access Multiplexer See RAM.

Remote Access Server RAS. A remote access server (also called a Remote Access Device or in a bigger version, a Remote Access Concentrator) is a piece of computer hardware which sits on a corporate LAN and into which employees dial on the public switched telephone network to get access to their email and to software and data on the corporate LAN (e.g. status on customer orders). Remote access servers are also used by commercial service providers, such as Internet Access Providers (ISPs) to allow their customers access into their networks. Remote Access Servers are typically measured by how many simultaneous dial-in users (on analog or digital lines) they can handle and whether they can work with cheaper digital circuits, such as T-1 and E-1 connections. See also Remote Access Concentrator and Universal Edge Server.

Remote Access Service Software that enable distant PCs and workstations to get into a Remote Access Server to get to software and data on a corporate LAN. Remote access services are provided through modems, analog telephones or digital ISDN lines. Remote access services is For a much longer explanation, see Remote Access (Ref: Hands-On Networking Essentials, M.J. Palmer, Course Technology, Cambridge, MA, 1998, p. 293)

Remote Access To PBX Services Allows a user outside the PBX to access the PBX by dialing it over a normal phone line. You dial the number. It answers. It may or may not say anything. It may just give you dial tone. You now punch in an authorization code. If your code is acceptable, the PBX gives you another dial tone. That dial tone is effectively the one all users within the PBX get. Once you have this dial tone, you can dial another extension, jump on the company's WATS network, get into the dictation unit, access its voice mail, or whatever. Suffice, you are inside the PBX. You can do whatever anyone else inside the PBX can do.

Remote Adapted Routing The adaptation of backbone routing techniques that take into account; slow-line communications links, intermittent connections, security, chatty routing protocols, management, and user ergonomics.

Remote Batch Processing Processing in a computer system in which batch programs and batch data are entered from a remote terminal or a remote PC (personal computer) over phone lines.

Remote Bridge A bridge between two or more similar networks on remote sites. Dial up or leased lines typically require a local bridge or gateway and a remote bridge or gateway on each end, in order to network.

Remote Call Forwarding RCF. This is a neat service. It allows a customer to have a local telephone number in a distant city. Every time someone calls that number, that call is forwarded to you in your city. Remote call forwarding is very much like call forwarding on a local residential line, except that you have no phone, no office and no physical presence in that distant city. Remote Call Forwarding exists purely in the central office. You can also think of it as measured Foreign Exchange. Companies buy Remote Call Forwarding for three reasons: 1. To encourage distant customers to call them by giving them a local number in their own city to call. (This the most obvious reason for an IN-WATS line, a FX or a RCF line); 2. They buy RCF over IN-WATS or FX lines because they don't have the volume to justify these potentially more expensive lines. 3. Companies buy RCF lines as overflow lines from IN-WATS and FX lines. They use their RCF lines when the other lines (FX and IN-WATS) get busy during peak busy periods. Remote Call Forwarding calls are typically charged at the same price as normal DDD calls (i.e. the most expensive to call). And you can't, as yet, reprogram RCF calls easily. You have to place an order with your friendly telco and wait for them to do the reprogramming. In 1994 Northern Telecom announced a service whereby remote call forwarded calls carried from its central office would carry the calling line ID number. This way when the call reached the distant number, it could be handled in an intelligent fashion.

Remote Concentrator A remote multiplexer. A device which places more than one distant user on two cable pairs. The idea of a remote concentrator is to substitute electronics for cable. It's simply cheaper to put electronics on either end of two cable pairs and drive many conversations through those wires, than running extra cables (digging streets, erecting poles, etc.)

Remote Control Remote control software allows a remote PC to connect to the network via a PC that is on the LAN. You must use such software for working from home, for sending in your work, checking on your email, etc. See Remote Node.

Remote Data Services A Web-based technology that brings database connectivity and corporate data publishing capabilities to Internet and intranet applications.

Remote Diagnostics You own a phone system. You have a service company. There's some problem with it. Instead of sending a technician out, your service company dials your PBX from a data terminal or PC and "asks" your PBX in computerese what's wrong with it. If it isn't too broken, it will come back and give you some indication. This is called remote diagnostics. Some service companies call all their customers' phone systems every morning and run routine remote diagnostics on their switch. It's like going to the doctor for a daily physical. Sometimes this test may find a problem before the user is even aware. Sometimes the problem can be repaired on-line. If not, the service company will have to dispatch a technician. Remote diagnostics is a good idea. More phone systems should have it. To do remote diagnostics on a telephone system, you will typically need a phone line dedicated to the PBX and a modem on either end.

Remote Digital Loopback A test that checks the phone link and a remote modem's transmitter and receiver. Data entered from the keyboard is transmitted from the initiating modem, received by the remote modem's receiver, looped through its transmitter, and returned to the local screen for verification.

Remote Hands A recent telecom term, and service. Remote hands refer to a variety of services that give you some level of remote control and oversight in distant rented facilities. In order to get you to telehouse your routers and servers in a carrier's Internet Exchange Point, the company advertises the fact that it supports "remote hands capability," meaning that you can access information about your equipment. In some cases you can also change its programming, security codes, or operating temperature, and even look at it 24 hours a day using a remote camera.

Remote IP A telephone company AIN term. When an SCP/Adjunct requests a local AIN switch to make a connection to an IP to which the AIN Switch does not have a direct ISDN connection, the indicated IP is referred to as a remote IP.

Remote Job Entry RJE. Remote Job Entry occurs in computer operations where work or input is sent in remotely over phone lines. That "work" might include the day's sales of a distant store.

Remote LAN Interconnection The connection of two or more LANs which are remotely located from each other so that LAN users can communicate with users and servers on any of the interconnected LANs.

Remote Line Concentrator A multiplexer. A device that "concentrates" several users' lines on a fewer number of trunks. Typically, a remote line concentrator is used because it's cheaper, easier or more flexible to substitute electronics for cable. See Remote Concentrator.

Remote Line Switch A line unit mounted near a cluster of users and equipped with intracalling capability.

Remote Line Unit A remote line concentrator without intracalling capability. See Remote Concentrator and Remote Line Switch.

Remote Live Screening See LCS.

Remote Maintenance Facility See Remote Diagnostics.

Remote Monitoring A call center term. Remote Monitoring is most frequently used by service agency clients. This is the process whereby a qualified/authorized party can dial into a remote call center and monitor certain telephone calls. The process is usually administered from a specially designated room or place away from the agent's work area. The agent may or may not know that the specific call is being monitored.

NEWTON's TELECOM DICTIONARY

The Official Dictionary of Telecommunications, Networking and the Internet

by Harry Newton with Ray Horak contributing editor

17th Updated and Expanded Edition

I wrote this book for those of us in the world's most exciting industries - telecommunications, networking and the Internet. I deliberately didn't write a book that only geeks could understand. I wrote a business book that you and I could understand. I explain technical concepts in non-technical, business language that anyone in business (whether buying, selling or investing) should be able to understand. Some of my definitions are short. Some are encyclopedic. My focus is 100% practical. What the term means. What the technology does. What benefits the technology confers. Which pitfalls to watch for. Use this book in your day-to-day business life. Dip into it before a meeting with a vendor, a customer, a broker or a boss. I've got 19 years in this book. My readers and my contributing editor, Ray Horak, have contributed enormously over the years. By now, all of us have made this dictionary pretty darn good. I'm proud of this edition.

Harry Newton

Harry Newton has 30 years in telecommunications. He founded LAN (now Network) Magazine, the first networking magazine. He founded three leading monthly telecom magazine - Call Center, Computer Telephony, and Teleconnect. He also founded the enormously successful trade show, Computer Telephony Conference and Exposition (CT Expo). He is (of late) a successful angel (early venture capitalist) in telecom, networking and Internet ventures. Recently he started a monthly newsletter, Harry Newton's Technology Investor. For a subscription go to www.TechnologyInvestor.com. Newton holds an MBA from the Harvard Business School and an Economics undergraduate degree from the University of Sydney, Australia. He is not an engineer. But he knows enough to be dangerous in front of them. And that, he says, is the ultimate thrill.

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